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THE
BRASS WORLD
AND
PLATERS' GUIDE

A JOURNAL
DEVOTED TO THE
ART OF REFINING,
ALLOYING, CASTING,
ROLLING, FOUNDING,
AND ELECTROPLATING
OF ALL THE
NON-FERROUS
METALS

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EDITED BY
ERWIN S. SPERRY

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BRASS WORLD
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VOL. V. BRIDGEPORT, CONN., JANUARY, 1909. No 1.

A MONTHLY JOURNAL

devoted to the Art of Refining, Alloying, Casting, Rolling, Founding and Electroplating of all the non-ferrous metals and their alloys.

PUBLISHED BY THE

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No. 260 John St. Bridgeport, Conn., U. S. A.

ERWIN S. SPERRY . . . . . EDITOP

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The Essential Difference Between Lake, Electrolytic and Casting Copper.

The United States is the largest producer of copper of any country in the world. The names applied to the various grades are somewhat different from those employed in other countries. As used in this country, three general terms are given to commercial ingot copper. They are as follows:

1. Lake Copper.
2. Electrolytic Copper.
3. Casting Copper.

Lake copper is the one commanding the highest price. It is made from copper ore, found in the famous region around Lake Superior. This ore is in the metallic condition and is very pure. The smelting process is quite simple, as the operation consists practically in removing the rock, with which the copper is found associated and then melting the metallic residue. As the copper ores found in this region are of high purity and the copper is in the metallic condition, the ingot copper made from it is likewise pure. The whole Lake copper problem may be said to rest upon the purity of the ore. Foreign elements in the nature of impurities are not likely to contaminate it.

The electrolytic copper problem is quite different from that of the Lake material. Every kind of ore imaginable is used, and those containing all kinds of impurities. The electrolytic process, used for refining the copper, is employed for two purposes: First, to allow the removal of the gold and silver. Secondly, to purify it to the highest possible degree. As ores of varying purity are used in the making of copper by the electrolytic process, and the refining is, so to speak, a rather delicate operation, there has been in the past, (although much less now) the element of lack of uniformity in shipments of this grade. It is possible to make copper by the electrolytic process of far greater purity than that of the Lake grade, but the fact that it does not bring as high a price in the market, indicates that consumers, even at this day of metallurgical perfection, do not consider it equal. It may be said, however, that each year witnesses a larger consumption of electrolytic copper than in the past. This fact seems to indicate that the day is not far distant when both the Lake and electrolytic coppers will be considered of equal value and be used indiscriminately.

As far as casting copper is concerned, it may be said that it consists of anything that can be used in making sand castings. The requirements of brass or bronze castings are not as severe as those of the rolled metal, and for this reason, grades of copper containing more or less impurity can be successfully used. In other words, casting copper is not highly refined. Practically all of the refuse from brass rolling mills, brass foundries, and other metal establishments, that is sold to copper smelters for the copper it contains, is made into casting copper. Casting copper is, in reality, of less purity than the Lake or electrolytic grades, and contains so much foreign matter that it cannot successfully be used for making brass for rolling, or in the manufacture of copper sheet or wire. It is suitable only for making brass and bronze to be used in the manufacture of sand castings.

Making Chloride of Zinc for Tinning.

Large quantities of tinned articles are daily manufactured, such as food-choppers, tinned-spoons, saddlery hardware, and a large variety of cooking utensils. The tinning is done upon iron or steel, and by dipping the article in molten tin. In order to have the tin adhere to the iron or steel, it is necessary to use a flux of chloride of zinc into which they are immersed previous to entering the molten metal. Unless this flux is good and completely covers the iron or steel when it is immersed in the tin, spots will be found on the finished article upon which the tin has not adhered. This difficulty is very often found upon goods with a polished surface and where a perfect coat is necessary. The polished surface renders the imperfections more conspicious.

Many establishments make their own chloride of zinc by dissolving metallic zinc ("cutting" it) in commercial muriatic acid. It is possible, of course, to make good chloride of zinc in this manner, but many operators fail to do so. The result is poor tinning. There are two essential features in tinning. First, the iron or steel must be clean or the tin will not adhere. Secondly, the flux must be good and applied to the article to be tinned completely.

In making chloride of zinc for use as a flux in tinning, the quality of the zinc is not important. Sheet zinc scrap can be used with good results if desired. A good grade of commercial spelter, however, will be found very satisfactory as it is readily broken up and dissolved. The muriatic acid need not be chemically pure, and small quantities of iron or other foreign elements have never been found to interfere. The essential feature of the acid is that it should be strong. For this purpose, the 22 degree commercial muriatic acid is generally used.

No water is added to it. The zinc is added in small quantities at a time in order to avoid too rapid an action. The dissolving must be allowed to go on until the acid will take up no more zinc. When this has been done, it is preferable to allow the liquid to settle and then draw off the clear liquid. Black flakes of undissolved lead is the material left in the bottom.

The chloride of zinc thus obtained is strong and oily. If water is added to it, it does not work as well. The presence of free acid also injures it. The success in the use of the flux, therefore, lies in having it strong, and without an excess of free muriatic acid in it.

When silver is melted, a certain quantity always volatilizes. The greater the heat, the more silver is lost. Gold does not volatilize as readily although a small amount is lost in melting. As far as known, gold volatilizes the least of any metal while melted.

Increasing the Tensile Strength of Aluminum-Bronze and Muntz-Metal by Quenching.

By Erwin S. Sperry.

One of the firmly rooted beliefs in the brass industry has been that copper alloys, while red hot, are not affected by quenching in water. This idea undoubtedly originated from the fact that steel, containing over a certain percentage of carbon, is hardened by such treatment. As brass and other copper alloys are not *sensibly* hardened by quenching, it has been assumed that they are not affected or altered in any way.

This idea, however, is gradually becoming dispelled and metallurgists are realizing that quenching actually does change the properties of copper alloys. Manufacturers of brass and German-silver sheet have found that it is unsafe to quench the brass if it contains considerable lead, and that it is actually dangerous to apply this treatment to German-silver. Common brass is not affected to such an extent as to be appreciable in rolling; but leaded brass or German-silver is quite apt to crack, particularly in "breaking-down," if quenched from a red heat. This fact is now well known in the brass industry, and care is taken in casting and annealing to avoid quenching these particular alloys.

During the manufacture of aluminum-bronze rods at one time, I found there was quite a discrepancy in the tensile strength obtained, although the mixture was identical and the method of rolling the same. From the investigations that had been made in the manufacture of steel about this time, it occurred to me that possibly the heat treatment of the bronze might have some bearing upon the subject, and I decided to make some experiments to discover, if possible, whether the effects of rapid or slow cooling were the same. The results obtained, and subsequently given herewith, demonstrated that not only is aluminum-bronze affected by sudden quenching from a red heat, but it is actually increased in tensile strength. The fracture of the metal is greatly changed by this treatment. The same experiments were then tried upon Muntz-metal, and while the tensile strength

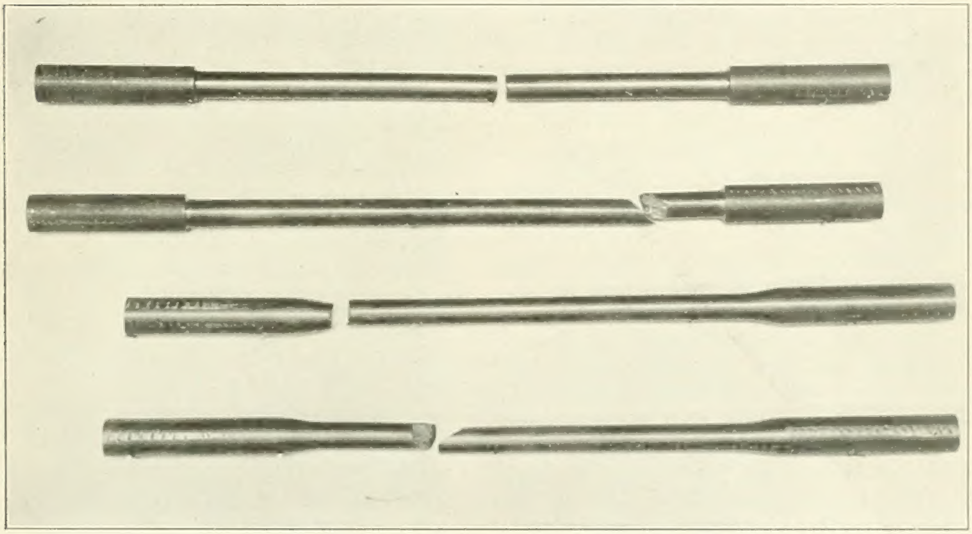


Fig. 1. Test Bars of Hot-Rolled Aluminum-Bronze Before and After Quenching. Those with Irregular Fracture are the Quenched Bars.

was increased and the properties altered, they were not as marked as those of the aluminum-bronze. As will be noted by referring to the tables in which the tests are given, the tensile strength of the aluminum-bronze may be increased from 15,000 to 20,000 lbs. per sq. inch by quenching. Reference to Fig. 2, in which are the fractures of the aluminum-bronze before and after quenching, will demonstrate that the character of the metal is entirely changed. In the case of the quenched bar, the fracture is coarse and almost fibrous, while that of the annealed bar, which was not quenched is fine grained.

Making the Aluminum-Bronze.

The aluminum-bronze used in these experiments was all hot-rolled rod. The purest Lake copper and aluminum were used. The copper was melted in a crucible under a good layer of charcoal, and when melted, the aluminum was added and the whole stirred with a graphite stirrer. The metal was then poured into ingots and remelted for pouring the billets.

The billet mold used was poured from the bottom, and was of the regular type of square cross-section. The billets were planed on all sides, and then rolled hot in a rod mill with the regular diamond and oval passes. Care was taken to obtain as good a heat as possible, upon the billets, as it was found by experience that aluminum-bronze rolls better when quite hot. It is less apt to crack. The billets were rolled to a round bar 1 in. in diameter. The mixture used for the aluminum-bronze was practically a 10 per cent. aluminum and 90 per cent. copper mixture. No other metals were used, and no additions in the form of fluxes made.

The tests below were partly made on the rod as rolled, and partly on those which were turned down. Great care was taken to select rods as perfect as possible.

Manner of Annealing and Quenching.

In order to have exactly the same conditions, both the quenched and unquenched rods were annealed together at the same heat. They were cut from the same length of rod, and then wired together. They were next placed in a muffle and heated slowly, until the right temperature had been reached, when the wire was removed. One bar was immediately quenched in cold water, and the other was allowed to cool surrounded by a mass of fire bricks on the floor. This method was followed in all of the experiments.

Testing.

The testing was carefully done on a Riehlé 200,000 lb. testing machine. Enough tests were made to avoid the factor of uncertainty in rod with flaws. In order to prevent any further possibility of error, some of the bars were turned down so as to eliminate the danger of surface cracks, should any be present in the bar. While many tests were made, it is deemed unnecessary to burden the reader with them all. Only enough are given to illustrate the point.

Material: 1 in. round aluminum-bronze (not turned down).

Analysis of the rod:

Copper	90.00%
Aluminum	10.03%
Iron	trace
Silicon	trace

As rolled:

Diameter	0.994 in.
Broke at	57,600 lbs.
T. S. per sq. in.	74,200 lbs.
Elongation in 1 in.	14%
Elongation in 8 in.	10.6%
Reduction in area	13.6%

Annealed and allowed to cool slowly. Temperature 1,300 degrees F.

Diameter	0.994 in.
Broke at	57,190 lbs.
T. S. per sq. in.	73,690 lbs.
Elongation in 1 in.	22%
Elongation in 8 in.	18.5%
Reduction in area	18%

Annealed and quenched in water. Temperature 1,300 degrees F.

Diameter	0.994 in.
Broke at	69,630 lbs.
T. S. per sq. in.	89,720 lbs.
Elongation in 1 in.	18%
Elongation in 8 in.	12%
Reduction in area	14%

Experiment No. 2.

Material: 1 in. round aluminum-bronze rod.

Length of test piece: 24 in., and not turned down.

Analysis of the rod:

Copper	90.18%
Aluminum	9.81%
Iron	trace
Silicon	trace

As rolled:

Diameter	0.992 in.
Broke at	54,850 lbs.
T. S. per sq. in.	71,050 lbs.
Elongation in 1 in.	9%
Elongation in 8 in.	7.2%
Reduction in area	11%

Annealed and allowed to cool slowly. Temperature 1,350 degrees F.

Diameter	0,992 in.
Broke at	51,400 lbs.
T. S. per sq. in.	66,000 lbs.
Elongation in 1 in.	20%
Elongation in 8 in.	16.5%
Reduction in area	17%

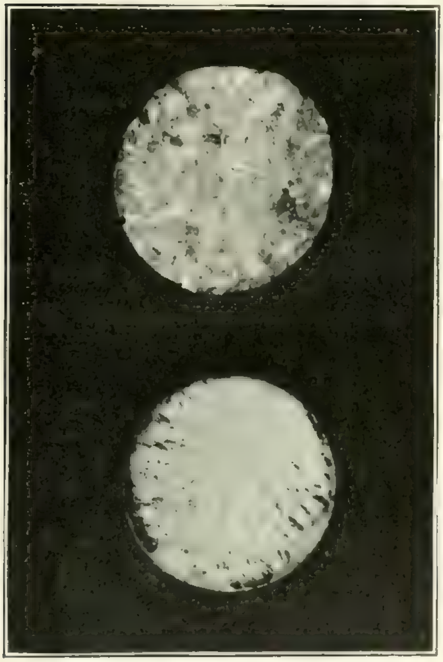


Fig. 2. Fracture of Rolled Aluminum-Bronze Before and after Quenching.

Top fracture Shows Bar after Quenching. Bottom fracture Shows Bar not Quenched.

Annealed and quenched in water. Temperature 1,350 degrees F.

Diameter	0.992 in.
Broke at	70,870 lbs.
T. S. per sq. in.	91,800 lbs.
Elongation in 1 in.	20%
Elongation in 8 in.	17.1%
Reduction in area	19%

Experiment No. 3.

Material: 1 in. round aluminum bronze rod.

Length of test piece 24 in. Bar turned down to ¾ in.

Analysis of the rod:

Copper	90.28%
Aluminum	9.70%
Iron	trace
Silicon	trace

As rolled:

Diameter	0.742 in.
Broke at	33,040 lbs.
T. S. per sq. in.	76,400 lbs.
Elongation in 1 in.	13%
Elongation in 8 in.	10.1%
Reduction in area	15%

Annealed and cooled slowly. Temperature 1,340 degrees F.

Diameter	0.750 in.
Broke at	31,640 lbs.
T. S. per sq. in.	71,700 lbs.
Elongation in 1 in.	18%
Elongation in 8 in.	15.3%
Reduction in area	undetermined

Annealed and cooled in water. Temperature 1,340 degrees F.

Diameter	0.740 in.
Broke at	43,010 lbs.
T. S. per sq. in.	97,010 lbs.
Elongation in 1 in.	22%
Elongation in 8 in.	12.1%
Reduction in area	17%

Experiment No. 4.

Material: Muntz metal rod 1 in. in diameter.

Length of test piece 24 in. and turned down.

Analysis of rod:

Copper	60.51%
Zinc	38.[illegible]
Tin	.47%
Lead	.28%
Iron	[illegible]

This rod had been hot rolled, and then cold rolled and straightened.

The mixture is one used for pump rods, bolts, etc.

As rolled:

Diameter	0.744 in.
Broke at	[illegible] lbs.
T. S. per sq. in.	64,000 lbs.
Elongation in 1 in.	[illegible]
Elongation in 8 in.	20%
Reduction in area	[illegible]

Annealed and cooled slowly. Temperature 1,[illegible] degrees F.

Diameter	0.761 in.
Broke at	25,620 lbs.
T. S. per sq. in.	56,330 lbs.
Elongation in 1 in.	70%
Elongation in 8 in.	40.2%
Reduction in area	50.9%

Annealed and quenched in water. Temperature 1,220 degrees F.

Diameter	0.748 in.
Broke at	26,860 lbs.
T. S. per sq. in.	61,120 lbs.
Elongation in 1 in.	20%
Elongation in 8 in.	27.7%
Reduction in area	20%

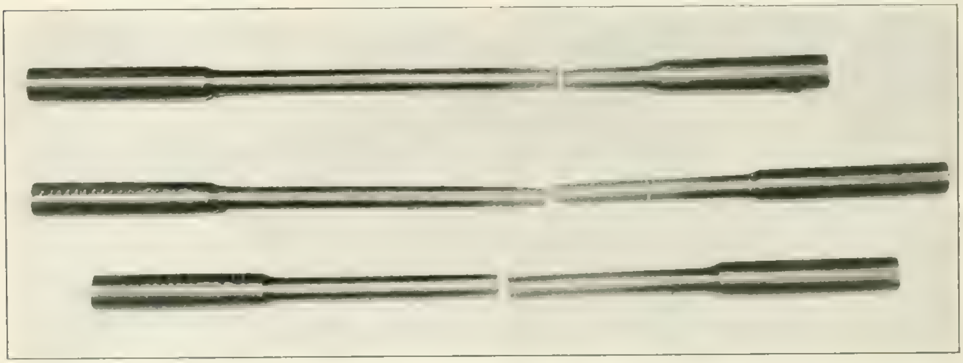


Fig. 3. Test Bars of Rolled Muntz-Metal as Rolled. After Annealing and after Quenching. The Top Bar is without Annealing. Middle Bar after Annealing. Bottom Bar after Quenching.

Summary of Results.

An attempt was made in testing these bars, both of the aluminum-bronze and the Muntz metal, to find the elastic limit and the yield-point, but without success. A Henning recorder was used and, excellent instrument that it is, it failed to give a curve that showed either a definite yield point or elastic limit. It is well known that in the bronzes these properties are ill defined, and the curve obtained in testing a bar of metal is gradual and shows no marked or abrupt change as it does in the case of iron or steel.

The foregoing tests show that by quenching aluminum-bronze from a red heat the tensile s'rength is increased with practically no change in the elongation and reduction in area. The structure of the metal is also changed, and instead of having a close-grained fracture, it becomes coarse after having been quenched. By referring to Fig. 2 the difference in the fractures will be seen. In Fig. 1 are shown the aluminum-bronze bars, while in Fig. 3 the Muntz-metal ones are shown.

It is apparent, therefore, that the heat treatment of metals is equally as important in working the copper alloys as it is with iron and steel. While quenching does not seem to change the ductility to a sufficient degree to prevent rolling or drawing, the structure of the metal is changed, and a more crystalline condition is formed. Such a condition is not satisfactory in rolling metals, and during the rolling operation the metal is apt to crack from the cleaving of the crystal faces.

Correspondence.

"Coslettized" Iron and Steel.

Editor:—

It is desired to call your attention to the article on "Coslettizing" in The Brass World, November, 1908, page 373. The process to which you refer is patented in the United Sta'es (No. 870,937, 1907). As the article inferred that no patent had been granted for the United States, I should be very glad if you would kindly bring before your readers, the exact facts of the case, as the publication of an error of this nature, if not corrected, would be detrimetal to me and might incidentally result in litigation.

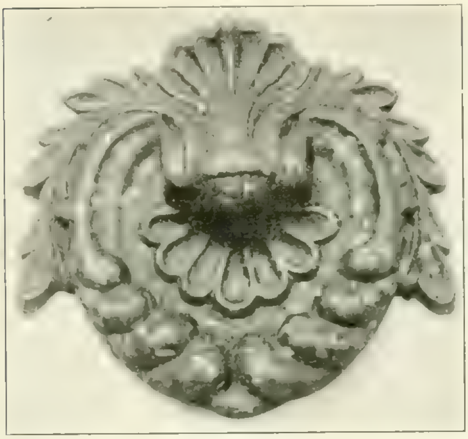
Thomas Watts Coslett.

Birmingham, England, Dec. 8, 1908.

Barnard's Method of Producing the "Snowflake" or "Crystallized" Finish on Brass.

The method herein described for producing the "snowflake" or "crystallized" finish on brass was discovered by E. A. Barnard, of New Britain, Conn., the well known electroplater.

The process is carried out as follows: The article to be treated is preferably of yellow brass, as the color of the finished article is then quite pleasing. It will have the greenish shade now so much sought. Flat surfaces usually have a better appearance than figured ones, for the reason that the crystals of the brass show better. The article is buffed to a good surface and cleaned as if to be plated. A slight flash of copper is next given it in a cyanide copper solution. A mere film is all that is required, and the deposit must not be heavy.



Yellow Brass Casting Showing "Snow-Flake" or Crystallized Finish.

The article now covered with a thin film of copper is used as an anode in an acid copper solution and the cyanide copper deposit "backed off." As soon as it is gone the crystals of the brass make their appearance. After the whole surface has become uniform the article is removed, rinsed and dried. After this has been done a heavy lacquer is applied.

The surface thus produced is shown in the illustration. A beautiful green shade is formed on the surface which serves to increase the beauty of the finish. The object of the preliminary copper deposit is to produce a uniform, clean and easily removed surface upon which the acid copper can act. The results produced by this method are very satisfactory.

The Smoke Finish as a Background for Name Plates.

In the manufacture of metal name plates, signs and similar articles, it is usually desirable to give them a black background in order to furnish the necessary contrast to the lettering. While there are many methods of producing this kind of a background, some of them are quite difficult and expensive to apply. Then, too, they fall short of giving the required color. An absolutely uniform and dead black color is the best and most attractive for the purpose.

The use of the smoke finish for producing this dead-black background on name plates and signs, particularly large ones, is attended with excellent results. The color is dead and absolutely black, and is easily applied. While it involves some hand labor, the results are quite rapid and easily carried out. The best results are obtained where the letters are not too shallow, or are sunk [illegible].

The method of carrying out the smoke finish is to surface the faces of the letters, preferably with a disc-grinder, and then clean the name plates as though they were to be plated. While the cleaning is not absolutely necessary, unless the plates are actually dirty, it is advisable on account of the fact that they are afterwards to be lacquered. When the cleaning has been done the plates are smoked over a gas flame or one that is smoky. It matters not what kind of a flame is used as long as the smoke is deposited over the whole surface.

When the smoking has been finished, which takes only a moment, the plate is allowed to cool, and then the faces of the letters are wiped off with a flat block of wood the face of which is covered with cloth. A round felt wheel, revolving rather slowly, say fifty revolutions per minute, is effective and rapid if considerable work is to be done. Whatever method is used, however, [illegible] in the smoke being wiped off from the surface of the letters. They are also left perfectly bright and clean. By the use of a flat surface for doing the wiping the letters are wiped without touching the smoke in the background.

The smoke, of course, will not stand handling, and in order to preserve it against injury it is necessary to lacquer it. It is a singular fact that the smoke may be lacquered without injury. A dip lacquer, however, must be used. The name plate with its smoke background, therefore, is dipped into some lacquer and allowed to dry. A lacquer of any desired color may be used. When it has dried the smoke will be found perfectly hard and firm and will resist all of the abrasion that can be put on lacquer. The smoke seems to color the lacquer without actually dissolving in it. It is not disturbed in any way. While spray lacquering has not been tried, it is possible that it will answer equally as well as dip lacquering.

A Peculiar Patent.

It frequently happens that patents of a very peculiar and often freakish nature are granted by the Patent Office. One of this character has been granted to a Vincenzo Massimino of Charleston, W. Va. It relates to the welding of copper. A fluid obtained from wild lettuce is used for the purpose. The inventor says:

"The fluid consists of a mixture of the juice of *L. sativa* or lettuce or more particularly the common wild form thereof known as *L. canadensis* and crushed dunglison or blue stone.

The proportions of the ingredients used are as follows: lettuce, two pounds and blue stone one ounce, the lettuce and blue stone being placed in any suitable form of press and the juice contained in the lettuce and blue-stone squeezed therefrom.

In the process of welding the copper ends to be united are brought to a desired heat and are then dipped in the mixture. The ends are then again heated the required time when they are taken from the fire and welded in the usual way."

Patents of this nature savor of the days of alchemy.

The "Bianco" Solution for Electrogalvanizing.

A method of electrogalvanizing known as the "Bianco" process has been in use for some time for electrogalvanizing sheet steel, and as the concerns using it have turned out quite creditable work, it may be of interest to know that the solution used for the purpose has just been patented (U. S. Patent 905,785, Dec. 1, 1908. *Electrolytic Solution for Zinc-Plating.* Celestino Bianco). The patent specification is somewhat vague in that it does not clearly define the solution, but gives the proportions of *metallic* contents used. The quantities in the patent are as follows:

Zinc	50 to 150 parts
Iron	2 to 15 parts
Aluminum	0.5 to 10 parts
Sodium	0.5 to 10 parts
Sulphuric acid	80 to 280 parts
Acetic acid	0.5 to 8 parts
Water	886.5 to 527 parts

It will readily be appreciated, therefore, that the preceding amounts of metals are somewhat meaningless. The claim, however, is made upon a solution containing the sulphates of zinc, iron, and aluminum and acetate of sodium. Upon this supposition, the proportions, calculated from the foregoing quantities of metals would be as follows:

Zinc sulphate	8 oz. to 4 lbs.
Iron sulphate	1 oz. to 8 oz.
Aluminum sulphate	½ oz. to 1¼ oz
Sodium acetate	¼ oz. to ½ oz.

The water given in the first table of proportions, is only sufficient to combine with the sulphates to produce water of crystallization. The amount of water to be used for dissolving the salts, therefore, is not given. As the usual electrogalvanizing solution generally contains about 2 lbs. of sulphate of zinc to the gallon, it is probable that the "Bianco" solution could be worked out in the following manner:

Water	1 gallon
Zinc sulphate	2 lbs
Iron sulphate	2 oz
Aluminum sulphate	½ oz
Sodium acetate	¼ oz

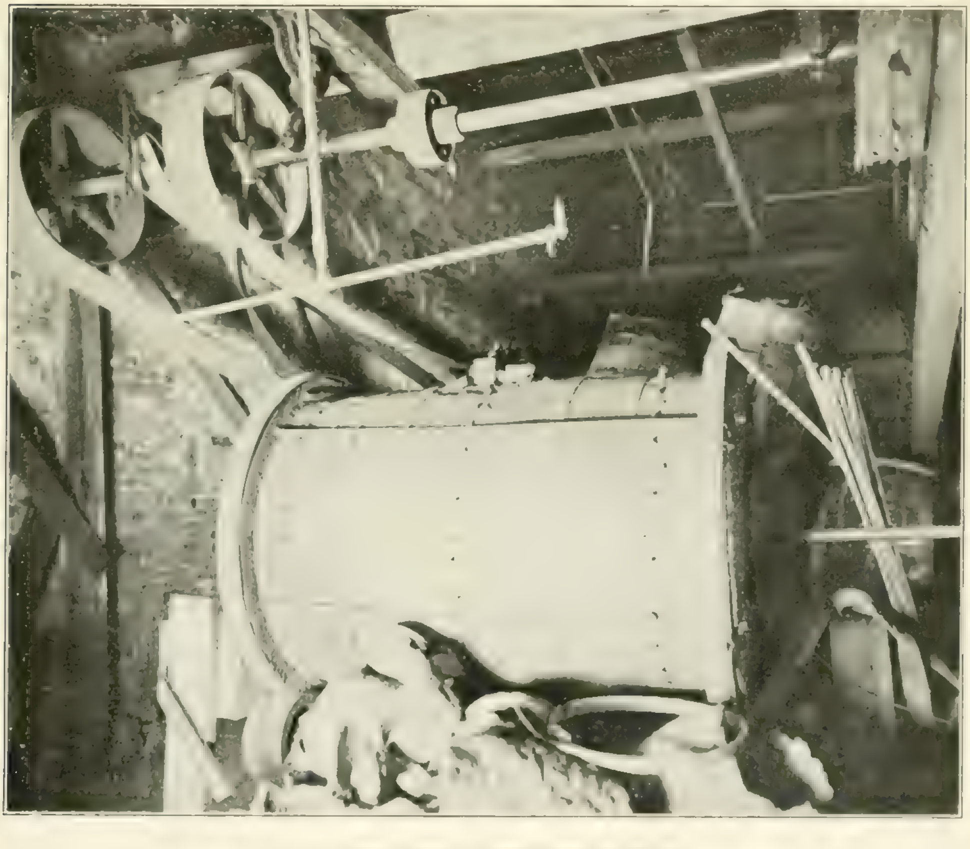
Nothing is said about the current density. The novelty of this solution seems to lie in the use of the sulphate of iron and acetate of sodium. The claim is made by the patentee that the zinc deposit obtained by it is smoother and whiter than that obtained in other ways. It is furthermore claimed that a much heavier deposit can be obtained from it without danger of roughness and the formation of "warts."

An Ancient Cinder-Crushing Machine.

That there is nothing new under the sun is illustrated by the discovery of the cinder-crushing machine herewith illustrated. It is built of heavy oak planks, two inches thick. The ends are made of similar material and the whole revolves on car wheels. The inside is lined with boiler iron one quarter of an inch in thickness. The huge machine stands about seven or eight feet from the floor and is proportionally longer.

As far as can be ascertained, this machine was built by a millwright in Elkhart, Ind., many years ago and was used in some establishment there for crushing and grinding brass furnace ashes in order to reclaim the metal. It was shipped East several years ago and is now owned by a scrap metal dealer in Bridgeport, Conn. Whether it antedated the advent of the Hill barrel upon the market is uncertain, but it seems to be the popular opinion that it was really the "progenitor" of all later washing machines.

In spite of its apparent freakish appearance, it is capable of doing good work and a large piece of scrap iron was originally used in the inside to do the crushing. It holds a cart-load of ashes and seems to wash rapidly and thoroughly. It is needless to say that it takes considerable power to operate it.



An Ancient Cinder Crusher Made of Wood.

Directions for Hardening Aluminum with Copper.

By J. A. Sayles.

For purposes in which great strength is unnecessary, copper is the best hardening material for aluminum, as the resulting mixture has excellent casting qualities. It does not shrink much and, best of all, it is not apt to crack in the mold like the aluminum and zinc mixtures. Many founders, however, err in the manner in which the copper is introduced into the aluminum and the resulting mixture is not satisfactory.

If the aluminum and copper are melted together the melting point of the copper is so much higher than that of the aluminum that the whole mixture is "burnt." Castings then made from it will be full of blow holes. On the other hand, to melt the copper and then add the aluminum is not practicable, for the reason that there is a greater quantity of the aluminum than there is of the copper and the whole mass chills before perfect alloying takes place.

I have used the following method for some time with the most satisfactory results, and believe that those who try it will find nothing wanting. I first make up a "rich alloy" of the following proportions:

Copper	1 lb.
Aluminum	1 lb.

The copper is melted in a plumbago pot and covered with charcoal while the melting is going on. When just barely melted, the aluminum is added a little at a time. When the first piece is added the whole is stirred and then some more introduced. The whole mass of metal will become white hot from the reaction between the copper and aluminum. When all of the aluminum has been added the metal is thoroughly stirred and then poured out into small ingots. Large ones may also be used, as the metal is easily broken.

The resulting alloy of aluminum and copper is white and brittle, and is readily fractured with a hammer so that small pieces can be obtained for weighing desired quantities.

When it is desired to make an aluminum and copper mixture all that is necessary is to use twice the quantity of the "rich alloy" that there is copper in the mixture. For instance, when it is desired to make the regular mixture used for general casting containing:

Aluminum	93 lbs.
Copper	7 lbs.

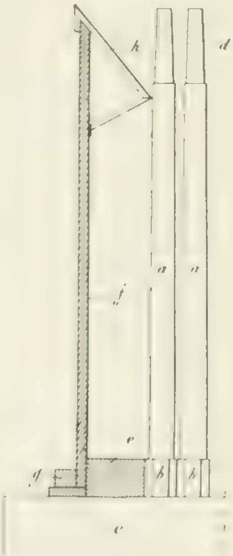
Then the following quantities of aluminum and the "rich alloy" are taken:

Aluminum	86 lbs.
Rich Alloy	14 lbs.

The aluminum and the "rich-alloy" are placed in the pot together. The melting point of the "rich-alloy" is so low that it easily melts and all that is needed is to stir. In this manner it is unnecessary to overheat the metal and pin holes are not apt to occur. In fact, I have had a less number of pin holes in my castings since I used this method of making the mixture of aluminum and copper.

Making Automobile Radiators by Electrodeposition.

A method of making automobile radiators by electrodeposition has been patented by Ernest Friedheim, of Paris, France (U. S. Patent 906,007, Dec. 8, 1908). The process consists in first making a mold of fusible metal then copper plating it to the desired thickness, and afterwards melting out the core of fusible metal. The usual method of making an automobile radiator by soldering frequently results in imperfect joints and also



increases the weight. By this method a solid radiator of great lightness may be obtained.

In carrying out the process a series of mandrels *aa* are set into a base plate *c*. These mandrels are of steel and slightly tapering. At the side a piece of sheet metal *f* is set to from the side of the mold. The fusible metal is poured into this mold and allowed to cool. The pins *aa* are driven out and the sides of the mold are removed. A core of fusible metal is thus left. This is copper plated in the usual manner to the desired thickness, and then the whole is heated until the fusible metal runs out. A shell forming the radiator is thus left. As a fusible metal, solder or similar low melting material is employed. The patent is on the manner of making the mold in which the fusible metal is cast and not on the formation of a radiator by electrodeposition.

Improved Method of Melting Magnesium.

Owing to the fact that the melting point of magnesium is low and it oxidizes rapidly when melted, the loss on melting, when carried out in the usual manner, is large. Paul Rakowicz, of the Chemische Fabrik Griesheim Electron of Frankfort on the Main, Germany, has patented a method of melting magnesium which it is said, minimizes the loss. The method is intended more particularly for melting magnesium in the process of alloying it with other metals.

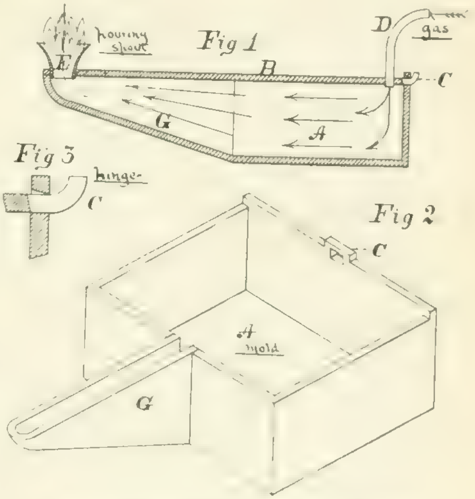
The method used is simple. The magnesium is placed in a graphite or clay crucible and allowed to arrive at a temperature beyond that of a pasty mass. If it does go beyond, more magnesium is added. When the whole of the magnesium in the crucible has become pasty the crucible is removed and the magnesium allowed to melt by the heat transmitted from the walls of the crucible itself. In this manner overheating the magnesium is avoided. It is well known that as soon as magnesium becomes slightly hotter than its actual melting point it combines with the oxygen and nitrogen of the air and wastes. If it can be prevented from rising to this excessive temperature the oxidation is prevented.

After the magnesium has been melted in the manner previously mentioned the other metals with which it is to be alloyed may be added. In this manner of melting, the inventor says, no flux is necessary.

Note on Rowland's Patent for Casting Brass in an Atmosphere of Illuminating Gas.

By Erwin S. Sperry.

The expiration of Rowland's patent for casting brass in an atmosphere of illuminating gas or other reducing agent has already been taken advantage of by a number of the brass rolling mills and it is probable that when its advantage is fully known, a still greater use will be made of it. Although the patent during its life has been legally active, it has remained dormant from a practical standpoint and no use was made of it.



Sketch from Rowland's Original Patent.

Like many other patents, little attention was paid to it at first, but later the value of an atmosphere of reducing gas was discovered by one of the brass manufacturers, and he was surprised to find that the process had already been patented. How strong the patent was I will not attempt to say, but the fact remained that brass manufacturers hesitated to use it as long as it remained in force.

The patent was issued to Henry A. Rowland, of Baltimore, Md., who was, at that time professor of physics at Johns Hopkins University. He has been dead a number of years. The patent was entitled, "Casting Brass and Other Metals," and the number of the specification is 272,088, and is dated Feb. 13, 1883. It has now expired.

Prof. Rowland was considered the foremost scientist in his line in the United States, and the process was devised for casting brass for use in one of his physical apparatus. He apparently appreciated that the ordinary methods of casting fail to give perfect results on account of the oxidation of the brass as it runs into the mold. The oxide thus produced becomes entangled in the metal and imperfect castings result. The presence of an atmosphere of illuminating gas or similar reducing agent serves to reduce the oxide which forms during melting and also prevents the accumulation or formation of any further amount.

While the illustration in the patent (herewith reproduced) cannot be said to indicate anything new in the casting line, it serves its purpose in explaining the method. The following is the verbatim text of the patent:

"Manufacturers have found by experience that in order to get a perfectly homogeneous casting with any of the metals that unite readily with oxygen when melted, it is necessary to produce two conditions: First, an atmosphere into which the metal is poured that will be free from oxygen, and, secondly, a means by which any oxide of the metal which has formed upon it before it reaches the mold may be reduced. Various means have been devised for these purposes; but in all of them the two conditions were the result of separate and distinct operations invented at different times and used independently of one another.

"Now, the subject of my invention and the thing of which I believe myself to be the first inventor, is a method by which these two conditions are produced at the same time, by one operation and the use of one material, with great economy of both time and material, and producing much more certain results than it has been possible to attain by any of the methods heretofore in use.

"My invention consists in forcing into a mold in which metal is to be cast a stream of ordinary illuminating gas or any other inflammable deoxidizing gas, as shown in the drawings at D, in such a manner that it will first fill it, thereby expelling the oxygen, and then flow out at the mouth. When the molten metal is poured it will ignite the gas at E, as it escapes from the mold, as soon as it comes into contact with it, and thus produce the reducing flame I, through which the metal must pass on its way into the mold. After passing the flame at I the molten metal flows down the inclined gutter G, before reaching the mold, and any oxide that may have failed to be reduced by the flame at I will either be driven back toward E by the force of the stream of gas that is flowing over its surface or be reduced by the waste heat of the molten metal, the atmosphere being free from oxygen.

"I do not claim to be the inventor of casting metal in an atmosphere of deoxidizing gas, nor am I the inventor of the method of reducing the oxide of metal by the use of a flame at the mouth of the mould; but I believe myself to be the first one who has ever used the ordinary illuminating gas or any other inflammable deoxidizing gas to accomplish both purposes by one operation, and that this is the cheapest and best method devised for the purpose."

That brass is greatly improved by casting in an atmosphere of illuminating gas is without question, and I can readily vouch for it. In casting brass for rolling, the greatest difficulty encountered is the defect known as "spills." They are caused by the entanglement of small particles of oxide in the brass as it enters the mold. The action of the air on the stream of molten brass is the reason for it. By surrounding the stream with illuminating gas, no oxide forms and no oxide enters the metal. Brass cast in this manner contains fewer "spills," and it is possible, by careful regulation, to cast it almost free. To be sure, the oil that is used on the surface of the mold burns at the mouth and partially envelops the stream of molten brass, but it fails to reduce the oxide completely on account of the fact that it does not begin to burn in a satisfactory manner until the mold is half filled. By the use of gas, however, the stream of metal can always be surrounded

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A potash solution used for cleaning work for plating should not be used too long. After a time it becomes contaminated with foreign matter which is apt to discolor the work. This is particularly true if soft metals and brass are both cleaned in it. Potash dissolves tin and lead, and when brass is cleaned, a slight amount is deposited on the surface. The best plan is to always use separate kettles for cleaning soft metals and brass and no difficulty will then follow.

A New Device for Treating Brass Skimmings.

The usual method of treating brass skimmings is to wash them along with the ashes from the pit. Not only does this result in loss, but it requires considerable labor in reclaiming them as well as the use of a washing machine. Many brass foundries possess a washing barrel, while others do not and depend upon the scrap metal refiner to wash them. This method is usually quite unsatisfactory, as the handling means expense and the refiner must make his profit. The loss, too, is equally as great as though the founder did his own washing.

A new appliance for treating brass foundry skimmings has recently made its appearance on the market, and is herewith illustrated. It is so simple that one is inclined to ridicule the idea. The device has proved so efficacious, however, that it has been in use in the casting shop of the Bristol Brass Co., of Bristol, Conn., for some time and has resulted in much saving to them. In Fig. 1 is shown the apparatus in use at this establishment, and a pot of brass actually being skimmed.

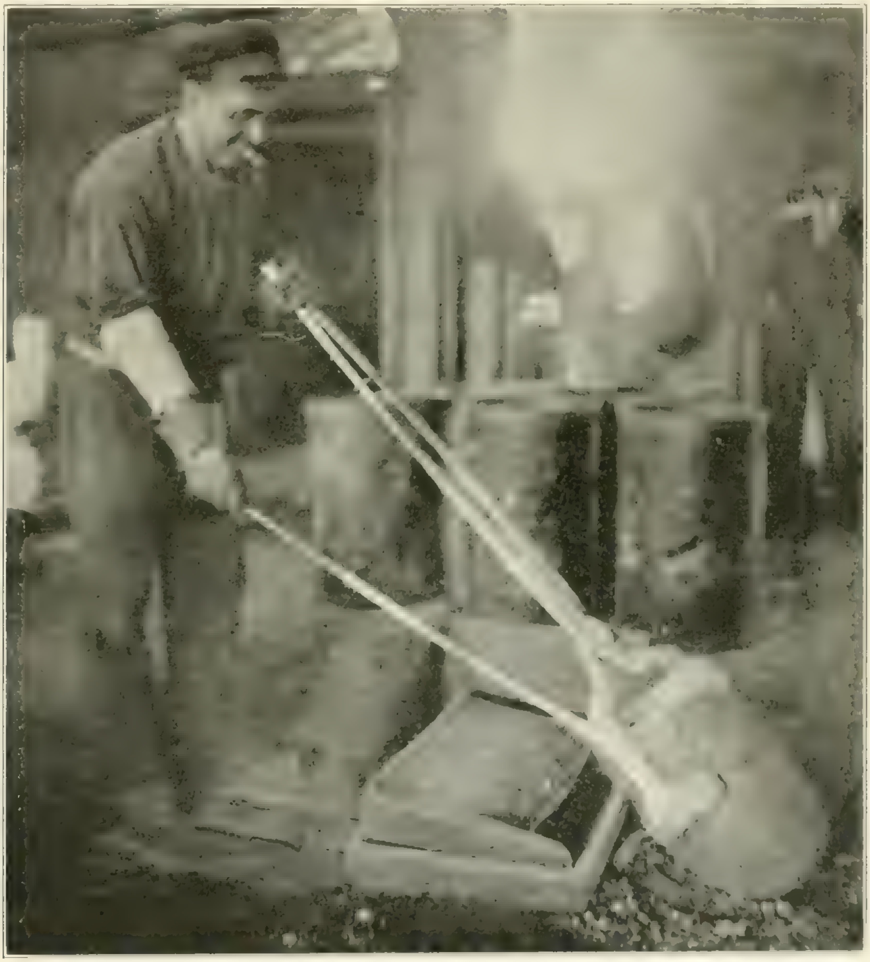


Fig. 1. Photograph Showing Method of Skimming into the Water.

The device is quite simple. It may be seen on the floor of the casting shop in Fig. 1, and in Fig. 2 is shown a cross-section of it. A square cast iron pan or trough is sunk in the floor so that it projects out above the floor line a few inches. Over its top a sheet iron cover is placed. It is made slanting so that the skimmings which accidently fall on to it may be brushed off into the water. One side of the cover is cut away, as shown in the illustrations, in order to allow the skimmings to fall into the water. The function of this cover is to prevent the water and metal, should any be accidently spilled into the trough, from flying up on to the person doing the skimming.

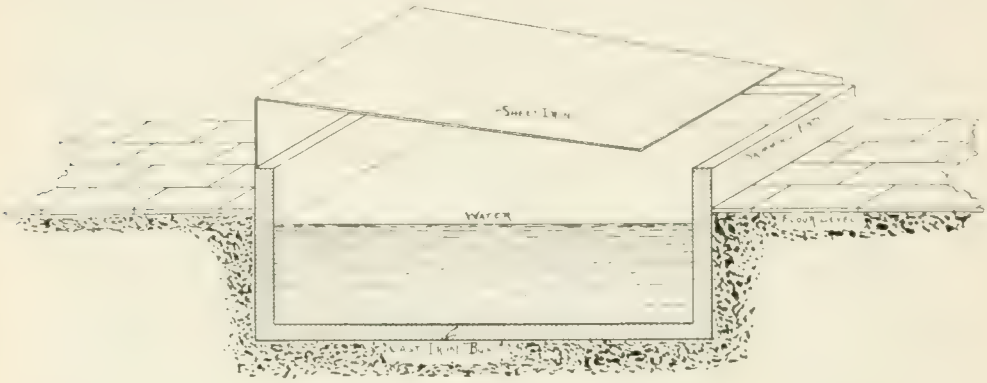


Fig. 2. Sketch of Device in Cross-Section.

The crucible to be skimmed is placed in front of the device and the skimmings drawn away from the surface of the metal by the regular skimmer. They are allowed to fall into the water. When desired, the cover is then removed, and the charcoal skimmed from the surface of the water and allowed to dry. This charcoal may be used again. The skimmings are then removed from the bottom of the trough and allowed to dry by placing them on the back of the furnace or elsewhere. They are practically all metal, and may be placed back in the crucible. The oxide in the water is not metallic and may be thrown away or, if desired, saved and sold for copper contents.

This device has proved so satisfactory that an application has been made for a patent upon it. The claim is not made for the form of apparatus employed, but upon the actual skimming into water. The company states that they believe such practice is actually new. The Metal Dross Economy Company, of Bristol, Conn., has been formed to market the process and has already granted shop rights to a number of concerns to use it.

Producing a Brown-Black Color on Yellow Brass.

It is usually supposed that yellow brass can not be oxidized by liver of sulphur, and as far as the production of a good color by the usual liver of sulphur solution used for oxidizing copper is concerned, it cannot without modification. It is possible, however, by the use of caustic potash in the liver of sulphur solution, and using it hot, to obtain a good, brown-black color on yellow brass of all kinds.

The proportions need not be exact, and all that is necessary is to add some fresh and clean caustic potash solution to the liver of sulphur solution employed in oxidizing copper. The solution is used warm or hot, although it need not be boiling. A solution may be made up in the following manner:

Water	1 gallon
Liver of Sulphur	2 oz.
Caustic Potash	8 oz.

The brass to be colored must be clean, otherwise the color will be spotted or uneven. It is dipped into the solution and allowed to remain for a few seconds and then the color noticed. It generally takes about half a minute or more for the desired color to be produced, and after it has reached this condition, the article is removed, rinsed in cold water, then in hot water, and dried in sawdust. The surface is then scratch-brushed to bring out the desired lustre.

The caustic potash apparently causes the liver of sulphur to act on the brass. The addition of a small quantity of ammonia frequently aids the formation of a good, brown tint, but in the majority of instances it is not required as the color is easily obtained.

An Improvement in the Rockwell Tilting Crucible-Furnace.

A modification in tilting crucible-furnace construction has recently been made on the furnace manufactured by the W. S. Rockwell Company, 50 Church St., New York City. This modification is a marked improvement in crucible-furnace construction, but is not intended to supplant in any way the furnace which this company manufactures. It has been designed to meet the requirements of certain instances in which the other construction scarcely meets the demand for a furnace for high temperatures or particularly severe service.

This new furnace is called the "Rockwell Double Chamber Tilting Crucible Furnace." The advantages of this type of furnace are best realized in the larger sizes where the melting of heavy charges is desirable without loss of time, or where very high temperatures are desired in a small furnace to melt metals with a high melting point, such as nickel, steel and similar metals or alloys.

In the single chamber furnace where the chamber, crucible and weight of the charge are comparatively small, the flame and heat from the combustion chamber lap well around the crucible and melt the charge of metal rapidly from all sides, so that the average time to melt a 400 lb. charge of brass or copper is about 45 minutes after the first heat has been taken out. Owing to the fact that the furnace is cold upon the initial charge, the first heat consumes about one and one-quarter hours. But when 800 or 1000 lb. charges of metal are to be melted the mass of cold metal in the crucible absorbs the heat so rapidly that unless the furnace is supplied with more than one combustion chamber the time of melting is too much prolonged. In such cases there is a tendency to oxidation and wasting away of the metal in the crucible. This is especially true when scrap brass carrying a high percentage of zinc is being melted, or where metals with a high melting point are used.

When large quantities of metal are to be melted in regular practice it is cheaper to melt in a large crucible, and it is then easier

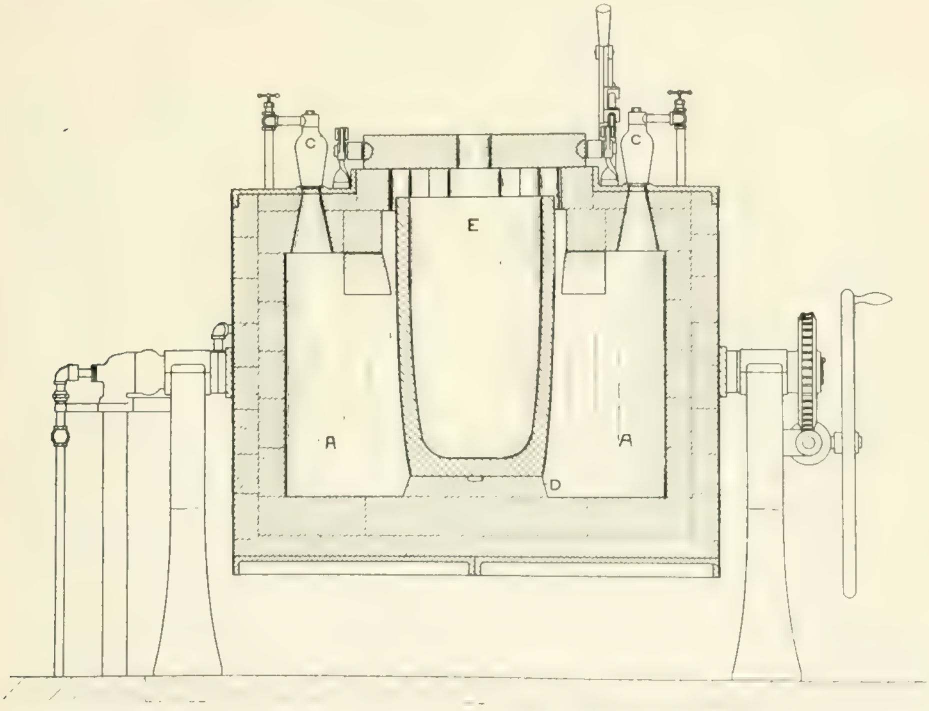


Fig. 1. Elevation in Cross-Section of the Improved Rockwell Tilting Crucible Furnace.

to obtain more uniform metal. In this connection it may be said that the fewer the units of a melt the fewer the opportunities for error. The labor required to operate an improved 800 or 1600 lb. furnace is practically the same as that necessary with one of 400 lbs., while the time consumed is proportionately smaller owing to the even distribution of heat upon all parts of the crucible.

Two sketches of the improved construction are herewith shown. In Fig. 1 the elevation in cross-section is illustrated, while in Fig. 2 a plan in cross-section is shown. The furnace is of practically the same construction as that of the single chamber (see The Brass World, August, 1908, page 267, in which the single furnace is described) with the exception that two oil burners are used, and a combustion chamber is situated upon each side of the crucible.

Referring to Fig. 1, the combustion chambers are designated AA. The oil burners are shown by CC. The crucible E is situated in the middle of the furnace, as usual, and rests upon the pedestal D. In Fig. 2 the manner of operating the two burners may be seen. One valve governs both burners and there is but one air valve. They are conveniently reached from the hand wheel so that one operator may control every operation from this location. The lining and other features of the furnace are the same as those of the smaller types. The 200 and 400 lb. sizes are built with single combustion chambers, and the 800 and 1600 lb. sizes are supplied with the double combustion chamber only.

The advantages of the double chamber furnaces, therefore, are in the rapidity with which large quantities of metal may be melted, and for use in melting metals with a high melting point such as steel or nickel. The furnace is designed for oil, but may be used with gas if desired.

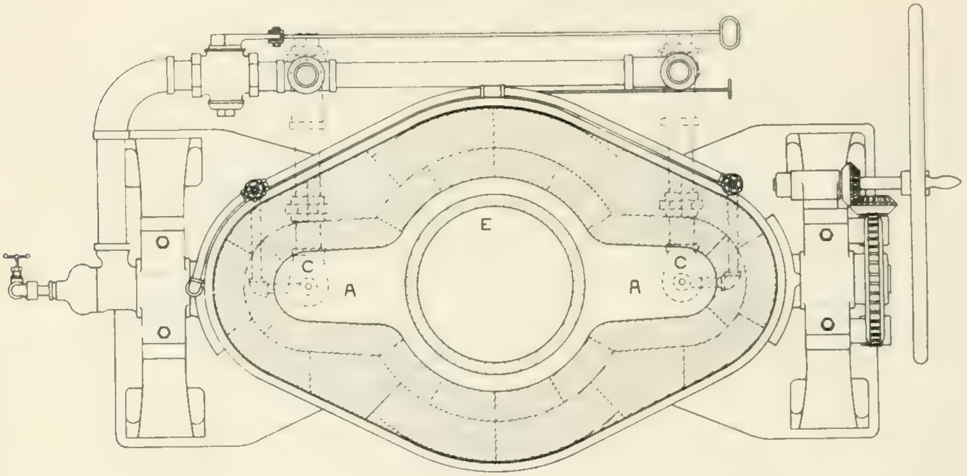


Fig. 2. Plan of Furnace in Cross Section.

Pure silver is harder than gold and softer than copper. Actual tests have shown that the hardness of gold, silver and copper to be in the ratio of 4: 5: 7.2.

Next to gold silver is the most malleable and ductile metal. It may be hammered into foil 0.0001 of an inch in thickness and a single grain can be drawn into wire over 400 feet long.

Brazed brass tubing is usually made of a mixture of 3 parts of copper and 1 part of spelter. It is necessary to use a mixture somewhat high in copper to allow the brazing to take place without melting it. The brazing solder used (called "spelter solder") consists of equal parts of copper and spelter.

Notes on the Cause of the Spotting-Out of Plated Work.

By Walter T. Donnelly.

In THE BRASS WORLD, December, 1908, W. A. Jones has written a very interesting article on the "spotting-out" of plated and lacquered work, and invites the profession to a discussion of its cause and cure. While I agree with Mr. Jones in practically all he says, it may be of interest to the trade to hear other views and opinions. Every plater of experience has his own views on the matter, and I shall endeavor to give mine. My own ideas of the cause and a correct way to avoid the difficulty are as follows:

Take an article that has spotted-out and examine the spots with a magnifying glass. A pit or sand hole will always be found directly underneath. Now in the polishing and buffing of the article these little holes become impregnated or stuffed with grease or tripoli, and in the rush to finish the work such contamination absorbs and retains potash, cyanide, etc. When lacquered, of course, this material gradually oozes out of the pores and produces the "spotting-out."

The remedy for the spotting as I have been accustomed to carry it out for many years, consists in the use of whale oil soap. When the articles enter the plating room they are placed in a boiling solution of this substance. They are allowed to soak in it for half an hour or more. Whatever grease or other foreign matter is in the pits or holes will then be dissolved, after which the regular finish may be carried on.

After the desired finish has been obtained the article must be allowed to remain in boiling water for a few moments and not jerked in and out, as it is usually done, before drying in sawdust. It is then placed in a very hot oven and allowed to remain an hour or more in order to "sweat out" the moisture from the pores. It is then removed allowed to cool, wiped and lacquered by any of the known methods. In an experience of twenty three years as a plater I have never found a better method than this. I do not hesitate to say that it is a correct one.

Green drip will appear from carelessness in lacquering, where lacquer is too thick or too thin, and the article *not* hung in the oven so as to catch the drip on an end point.

However, after all is said and done, everything depends upon the experience and intelligence of the plater. He must know the cause and effects of his "moves" when he directs his help, and make sure that they do as he desires.

In connection with the difficulty of spotting out and general plating dfficulties, it is amusing to hear a plater lay the blame upon the composition of the base metal when trouble is experienced. No matter what the composition of the metal is, if knowledge and "horse-sense" are exercised, all difficulties in the plating room will be overcome.

A New Japan Finish.

A new finish for japanned surfaces has been patented by Patricio Oramas of New York City (U. S. Patent 906,916, Dec. 15, 1908). The process is as follows:

The surface to be japanned is cleaned from grease and then given a layer of japan. When "tacky" some bran is dusted on and the whole baked in an oven [illegible] usually employed for baking japanned articles. A temperature sufficient to carbonize the bran is used. When this has been done the article is removed [illegible] the bran which does not adhere is carefully dusted off. A second coating of japan is given the article and is applied over the bran surface. After this it is again baked. A third coating may be applied if desired.

The surface thus produced, the inventor says, resembles leather, and may [illegible]

Fig: 1.

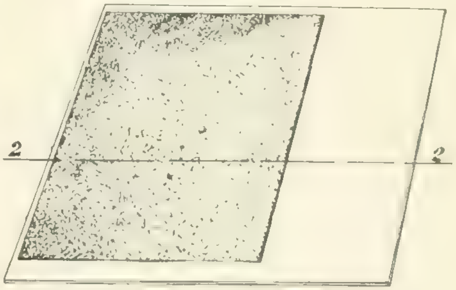


Fig: 2.

Sketch of Japanned Surface Showing Application.

[illegible] to imitate leather on the outside of opera glasses, lamp-founts and other objects frequently covered with leather. The process is a cheap and durable one. The stages of the process are herewith illustrated.

Use of Titanium in Producing Sound Copper Castings.

A. J. Rossi, of the Titanium Alloy Mfg. Co., who has been investigating titanium and its alloys for many years, has recently patented the use of a small quantity of titanium in the production of sound copper castings (U. S. Patent 905,232, Dec. 1, 1908).

The titanium is introduced into the molten copper by means of an alloy of copper and titanium containing from 8 to 10 per cent. of titanium. From 1 to 2 per cent. of this alloy is used. There is introduced, therefore, from 0.10 to 0.20 per cent. of metallic titanium. The inventor states that when this quantity of titanium is used there is found no trace of it in the finished copper casting. Its function, therefore, is to reduce the oxides and combine with the gases in the molten metal. Oxide of titanium is thus formed which floats to the top of the copper.

As evidence of the benefit which follows the use of titanium in producing sound copper castings, the inventor gives two experiments which he made in casting copper:

"1. In a usual brass crucible furnace I charged and melted 50 pounds of copper ingot which, when at the proper temperature, was cast, in equal proportions, in flasks containing sand molds, according to prior usual foundry practice. The resulting four bars of cast copper weighed seven pounds each, and being broken, contained large cavities and blow holes.

"2. I then, according to my said novel process, charged another lot of 50 pounds of the same copper into a similar crucible, with the addition of 1 to 2 per cent. in weight of a copper titanium alloy containing 8 per cent. of titanium or thereabouts. The conditions and procedure in this case were in all respects similar to those in the above described previous instance. The metal was submitted to the same heat until the addition was incorporated. It was then cast, in equal proportions, into four flasks prepared in all respects for casting as in the previous instance. The resulting four bars of copper were found to be perfectly solid, weighed from 12¼ to 12½ pounds each, and, when broken, showed a close grained, dense structure, without blow holes or cavities.

"Comparative physical tests were made of the two sets of bars resulting from the above described operations. The bars treated by my process were found to have an ultimate strength, elongation, and elastic limit four to five times greater than those of the said bars not treated by my process. Scarcely a trace of titanium was found, by analysis, in the bars treated, thus demonstrating that the action of the titanic ingredient was substantially confined to the elimination, or prevention, of obnoxious gases or oxides such as oxygen and nitrogen and the reduction of the oxides of copper formed during the melting of the metal."

A New Method of Grinding Glass.

Editor:—

As this company has discovered a new method of grinding glass it is believed that the process will be of value to many metal establishments that have occasion to grind their own glass as we ourselves do. We manufacture the Onward Sliding Furniture Shoe which takes the place of a caster, and as it is made of glass, the surface must be ground. This method is the only one that can be used to grind glass without filling up and practically leaves no scratches.

The feature of the method lies in the wheel. It is made of equal parts of the best Portland cement and silica sand. The two are mixed and tamped even. The advantage of this form of stone is that there are no hard and soft spots in it and glass may be ground without scratching it. The cost is only about ten per cent of that of an ordinary grindstone and we have used stones of this character with great success for a year.

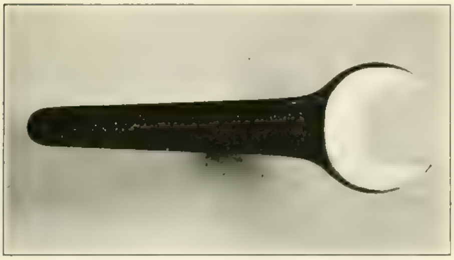
The Onward Manufacturing Company.

Better castings are always obtained by running the mold "up hill" than "down hill," as thq dross and other foreign matter then have a tendency to remain in the gate.

Silver plating solutions should not be allowed to concentrate by evaporation beyond the regular limit. When they become too strong the silver deposit is apt to be tough and granular.

The Black Oil Finish on Steel.

Many articles are found in the market with the black oil finish. It is also known as the burnt oil finish. It is a finish quite extensively used on hardware, particularly mechanics' tools, like wrenches, chisels, pliers, and similar implements. While there are several methods of producing it, one of the best is the following:



Article with Black Oil Finish.

The article to be finished is heated in a furnace, to cherry redness, and then plunged into oil (preferably lard oil). The article is then removed and the oil burned off in the furnace. After this has been done it is immersed in water. The oil must be kept cold when a large number of tools are to be treated, as the heat will cause it to burn. After the immersion in water, the surface will be found black and protected against rust. In order to bring out the best surface, a light film of linseed oil is applied to the article, and the excess then wiped off.

Platinum Plated Nickel Wire for Spark-Points.

The rapidly extending use of automobiles and other appliances in which gasoline engines are employed, has brought about a demand for a material to replace the very expensive platinum points used in the spark plugs. While platinum leaves nothing to be desired, it is so expensive that great economy is necessary in its use. The two qualifications necessary for a spark point—infusibility and freedom from oxidation when heated—are possessed by platinum.

A platinum plated nickel wire for use in spark points has recently made its appearance in Germany, which bids fair to replace platinum to a considerable extent. The process of making it is as follows:

The pure nickel wire is heated in a closed muffle raised to a red heat and in which hydrogen gas is allowed to flow. This gas acts as a reducing agent and reduces all oxide on the surface. At the same time any grease or oil on the wire is burned off. The wire is then scoured and is coated by electrodeposition with an alloy of platinum and nickel.

The solution used for plating the wire is prepared by dissolving 1 oz. of chloride of platinum in 1 quart of water. Then 3 oz. of ammonium phosphate dissolved in 1 quart of water are mixed with the chloride of platinum solution. This mixture is then poured into a solution made by dissolving 1 lb. of normal phosphate of soda in 2 quarts of water. Another solution is now made as follows:

Dissolve 1 oz. of metallic nickel in nitric acid (dilute) and after diluting with water, it is precipitated with phosphate of soda. After filtering out the green precipitate and washing thoroughly, it is dissolved in a solution of pyrophosphate of soda (just enough to take it up) and the whole made up with water to 1 gallon. This solution and the one previously made up are mixed. The resulting solution is now boiled until it no longer smells of ammonia and is faintly acid to test paper. Fresh water is then added to replace that lost by evaporation during boiling.

After the nickel wire has been coated in this solution by electrodeposition it is heated to about 1000° C. in an atmosphere of hydrogen gas in order to fix the plate. After this the wire is cleaned and given a pure platinum deposit. This is repeated until the wire shows no sign of oxidation when heated in the air. From three to five platinum coatings are usually required to give this freedom from oxidation.

The platinum plating solution that is used for this purpose consists of the following:

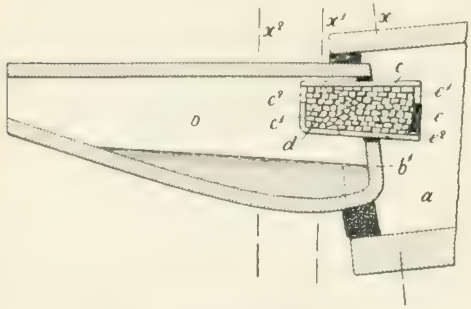
Water	1 gallon
Sodium Phosphate	1 lb.
Platinum Ammonium Phosphate	[illegible]

If desired, steel wire may be used for the base instead of nickel. In this case a nickel coating is first given it and the wire heated in hydrogen gas to fix it. The wire is then coated with the alternate deposits of platinum and nickel and pure platinum in the manner previously mentioned and followed in the case of the pure nickel wire.

It is possible by carefully following this process to obtain a platinum plated wire which will give good satisfaction when used as spark points in the ignition of the charge in a gasoline engine. The cost is much less than that of pure platinum.

A New Method of Refining Zinc.

The standard method of making commercial spelter from zinc ore is to mix the ore with coal and heat it in a clay retort. The zinc is reduced to the metallic condition, and being volatile, distills over and is caught in a condenser. Any lead or cadmium which may be present in the ore also distills over with the zinc. Cadmium is not always present, and when it is, is not a very injurious ingredient. Lead, however, is a very common impurity and greatly injures the spelter.



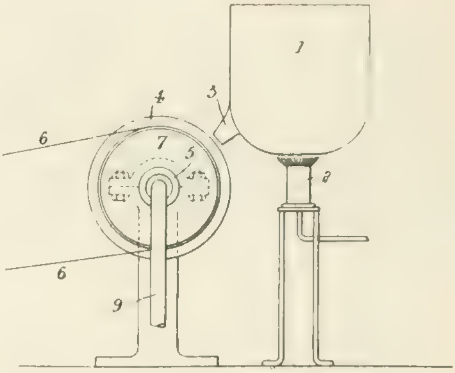
Receiver for Refining Zinc.

E. H. Shortman, of Bloxwich, England, of the Dellaville Spelter Co., of Spring Hill, England, has patented (U. S. Patent 905,753, Dec. 1, 1908) a method of eliminating the lead in the zinc fumes which distill over from the ore.

Referring to the sketch herewith illustrated, the retort is shown by *a* and the receiver by *b*. Where the receiver and retort join is placed a sleeve *c* of clay and filled with anthracite coal. The zinc fumes pass through this coal and the lead, the inventor says, remains in it. After two tappings of high grade zinc have been obtained the sleeve is pushed back into the retort where it does not interfere with the final distillation.

An Apparatus for Making Thin Ribbon of Zinc, Lead or Tin.

A method of making thin sheets of zinc, tin, lead or other low melting metal in the form of narrow ribbons has been patented by E. H. Strange and Chas. A. Pim, of Staple Inn, London, England (U. S. Patent 905,758, Dec. 1st, 1908). The apparatus for performing the operation is herewith illustrated.



Method of Making Metal Ribbon.

The metal to be treated is melted in a pot 1 by means of gas or other suitable means and allowed to flow out of an orifice 3. The metal flows on to a rapidly revolving wheel 4 maintained in motion by belt 6. The wheel is hollow and is cooled by water passing through the pipe 9. The wheel is revolved faster than the metal is allowed to flow from the pot. As it strikes the surface of the wheel it is cooled and forms ribbon. The shape of the orifice out of which the metal flows determines the size of the ribbon. If narrow the ribbon will be likewise, and a wide orifice produces a wide ribbon.

The use of equal parts of Portland cement and clean, sharp silica sand has been patented for use in furnace linings, crucibles and other materials subjected to heat. Cheapness is the feature claimed.

It is impossible to make absolutely dry chloride of gold as the heat necessary for accomplishing it decomposes it into metallic gold and chlorine. When good, it is quite moist and it is useless to attempt to dry any further.

A New Tandem Crucible Furnace.

Arthur C. Jackson of the Miller Lock Co., Philadelphia, Pa., has invented a new tandem crucible furnace for brass melting which possesses novel features. The furnace is herewith illustrated. A patent has been granted upon the construction of the furnace (U. S. Patent, 907,003, Dec. 22, 1908).

The furnace consists of two melting chambers 1 and 7 as shown in Fig. 1. In the first chamber 1, the crucible is placed in the usual manner and surrounded by coal or coke. In fact, this furnace is of the regular design employed in brass melting by means of coke. This furnace (called by the inventor the "primary" one) has two flues leading to the chimney. These flues are 5 and 10. The flue 5 leads directly to the chimney and is provided with a damper so that it may be closed when desired. The flue 10 leads to the so-called "secondary" furnace that is employed for preheating the crucible and metal before introducing into the primary furnace. This secondary furnace is designated by 7 in Fig. 1 and is raised above the primary one, so that the flue of the primary enters the lower part of the secondary. No coke or coal is used in the secondary furnace, but the waste heat from the primary furnace serves this purpose.

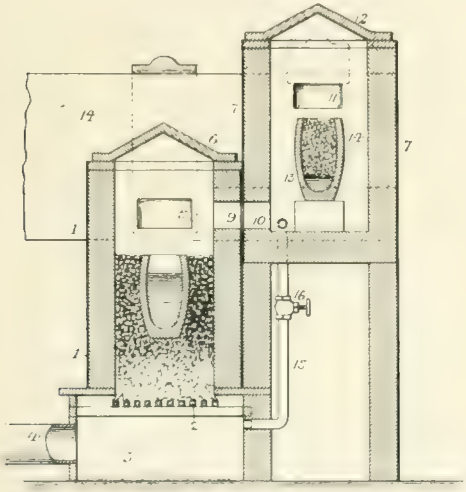


Fig. 1. Tandem Crucible Furnace for Coke.

To begin melting, the crucible, either empty or full of metal, is placed in the secondary furnace 7. When heated to redness by the waste heat which passes from the primary furnace, it is removed and placed in the primary furnace and the melting continued in the usual manner. The furnaces which are illustrated in Fig. 1 are intended to be used with a blast. The blast pipe which supplies the primary furnace 1 is indicated by 3 and leads into the pit 3. Leading from this pit is another pipe 15 which connects with the secondary furnace 7. The object of this pipe is to supply air to the secondary furnace and burn any unconsumed gases that may pass from the other. The air supply in this pipe may be regulated by the valve 16.

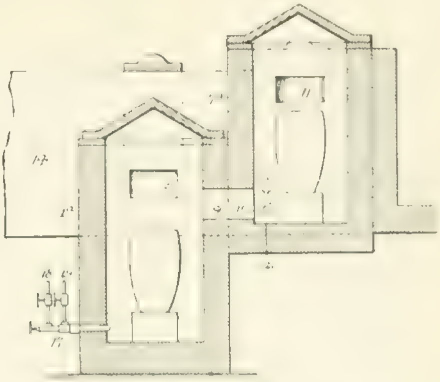


Fig. 2. Tandem Crucible Furnace for Oil.

The principle of this tandem furnace lies in the fact that the waste heat of the furnace actually used for the melting is employed for heating the next crucible to be used. In this manner time is economized as well as the consumption of fuel. The furnace is started with two crucibles, one in each furnace. When the first is poured, the second, already red hot, is then inserted in its place and a new one placed in the secondary furnace. In this way the process is continuous. In Fig. 2 the construction used for oil or gas is shown. The principle of utilizing the waste heat, however, is the same.

How to Make a Cyanide Copper Solution and the Manner in Which it Should be Used.

Third Paper.

Hot vs. Cold Solutions.

Were it not for the disadvantage of heating a solution, a cold cyanide copper plating solution would be used but very little, and possibly not at all. There is no advantage at all in a cold solution, and if platers fully appreciated the good work that can be done in a hot cyanide copper solution, it would be far more extensively used. Those who do use it invariably praise it.

A hot cyanide copper solution deposits metal very rapidly without "burning," and covers or "throws" exceptionally well. The copper deposit is much brighter and more uniform than that obtained from a cold solution and adheres more tenaciously. Then, too, it is self cleaning so that films of grease or oxide (on brass or copper, of course) are removed. When a hot copper solution is used a plater can be more slovenly in his preparation of the work than it is possible to be in a cold one. A hot solution acts, to a certain extent, like an electric cleaner. If it is possible to use a hot copper solution there are few cases where it should not be employed.

The temperature of a hot copper solution depends upon the conditions, but the hotter it is the more rapidly and more thoroughly it will deposit copper. In practice, however, it is difficult to maintain a boiling heat, or even approximately so, in a plating room. A temperature of 150 degrees F. will be found quite suitable, although a lower one may be used if desired, but the results are not quite as good.

An iron tank is better than a wood one for the solution when used hot, as the hot steam coil in the bottom of a wood tank and the constant heat of the solution gradually rot the wood. There is no danger of overheating in an iron tank, but care must be used to avoid short circuiting.

A hot copper solution need not be as strong as one used cold, for the reason that it deposits metal rapidly, and has an increased adhesion. The quantity of free cyanide may also be less, as the anodes keep clean more easily. Unless heavy deposits are desired, it is usually customary to use a hot copper solution at about half the strength that is employed for cold ones. A solution that is used at 10 degrees Beaume when cold may be reduced with water until it reaches 5 degrees when employed hot, and still obtain better results. This is quite advantageous in the case of soft metals, where blisters are apt to form. They are far less apt to be produced in a weak solution than in a strong one, but if a cold solution standing at 5 degrees were to be used it would be difficult to obtain a deposit from it.

It is impossible to give any rules about the strength of a hot copper solution, as it depends upon the work that is to be done. Cast-iron needs a rather strong one, while soft metals should be plated in a weak solution. It will have to be decided by the plater, but he will never find any difficulty in obtaining a good deposit either in a weak or a strong solution when used hot. The time consumed in obtaining a deposit from a hot copper solution is much less than with a cold one. It is usually possible to obtain one from a hot copper solution in five minutes that will stand the bright dip without cutting through. To obtain it in a cold solution would take from half to three quarters of an hour, and then there would be danger of the dip taking off the metal from some scantily covered parts. The advantage in the hot solution, perhaps, lies equally as much in the uniformity of the coating as it does in the amount of copper deposited.

For cast-iron a hot copper solution is particularly advantageous, as it is somewhat difficult to obtain a satisfactory deposit upon it from a cold solution unless it is used very strong. On steel, too, the hot solution is very efficacious. Indeed, it has been found both theoretically and practically correct, and its use is strongly advised, as far better work can be done with it and much time saved.

A brown color is obtained on solid bronze or bronze plated articles by the use of a liver of sulphur solution. The solution is best used slightly warm and the article then scratch brushed dry to bring out the desired color. This finish is often known as "statuary-bronze." The color should not be allowed to go too far in the liver of sulphur solution or it will become black.

New Automatic Electrogalvanizing Device.

Two new and novel electroplating devices have recently been invented by A. Van Winkle and J. T. Daniels, of the Hanson & Van Winkle Co. of Newark, N. J. These devices are herewith illustrated. One is used for electroplating chains and similar long strip material, and the other is employed for treating rods and pipes.

Machine for Plating Pipes and Rods.

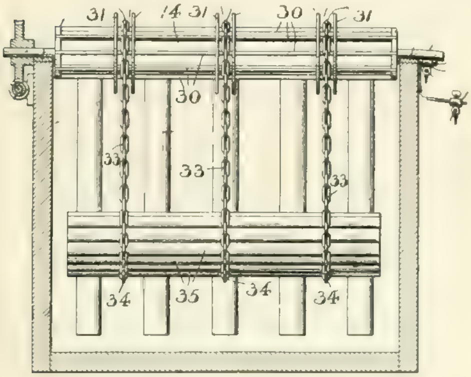


Fig. 1. Front View of Appliance for Treating Pipes and Rods.

The machine for electroplating pipes or rods (U. S. Patent 907,426, Dec. 22, 1908) is illustrated in Figs. 1 and 2. A regular plating tank is provided, on the top of which are cylinders 14 that extend across the top. These cylinders are revolved by means of bevel gears or sprocket chains, as may be desired. They are also furnished with grooved guides 31, over which chains pass. The chains are designated by 33. As the current must pass through the chains, the cylinders 14 are fitted with ribs 30 for making a positive contact.

At the bottom of the chains the tubes or rods 35 are placed. A large number of them are plated at once, as shown in the illustration. The anodes 13 are arranged in the usual manner. The cylinders over which the chains pass are revolved at any desired speed by the gears or sprocket wheels, and the bundles of rods then constantly turn over and over. The manner in which they are placed allows them to present fresh surfaces at frequent intervals so that the plating goes on evenly and in a uniform manner. While this method and apparatus may be employed for any kind of electroplating, it is particularly applicable to electrogalvanizing for the reason that the pipes or rods may be plated very cheaply and without the need of much hand labor.

Machine for Plating Chains.

The machine for plating chains is shown in Figs. 3 and 4. This device (U. S. Patent 907,425, Dec. 22, 1908) is designed not only for treating chains but other long articles like strips of sheet metal or wire. By its use the articles are not only plated, but polished at the same time. The polishing is performed by means of a brush that revolves in the solution and acts directly upon the surface of the metal that is being deposited.

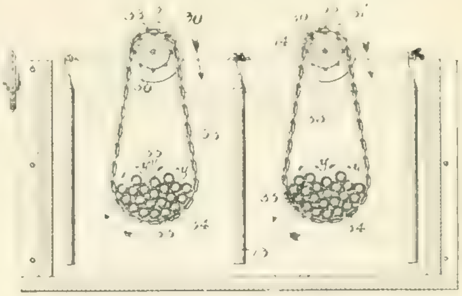


Fig. 2. End View of Pipe Appliance.

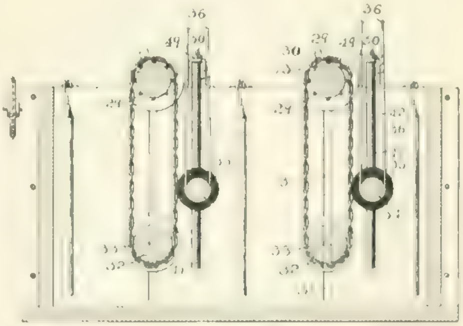


Fig. 3. Chain Plating Machine.

The appliance is shown in cross section in Fig. 3. The chains pass over cylinders 18 arranged across the top of the plating tank. These cylinders are operated by gears, sprockets or any other means. The brushes are shown by 29, and are usually of bristle. They are revolved by belts 36. By means of screws 49 the brushes may be raised or lowered to any desired position. In Fig. 4 the front view of the brushes may be seen.

The chain or other long articles to be plated is pressed upon the cylinders so that when they are revolved it will pass in and out of the plating solution and also against the brushes.

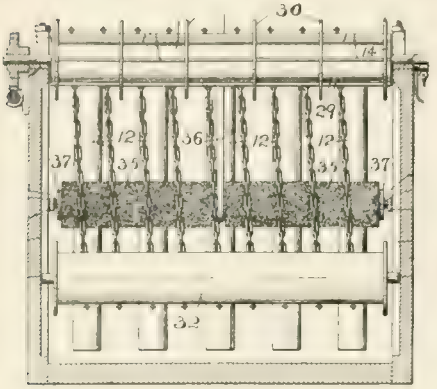


Fig. 4. Front View of Chain Machine Showing Brushes.

While the electrodeposition is going on the brushes are revolved and polish the deposit. In this manner not only can the plating be done in a rapid and automatic manner, but it is completed in a polished condition not possible to obtain in any other manner except by actual hand buffing. This apparatus is particularly applicable in electrogalvanizing

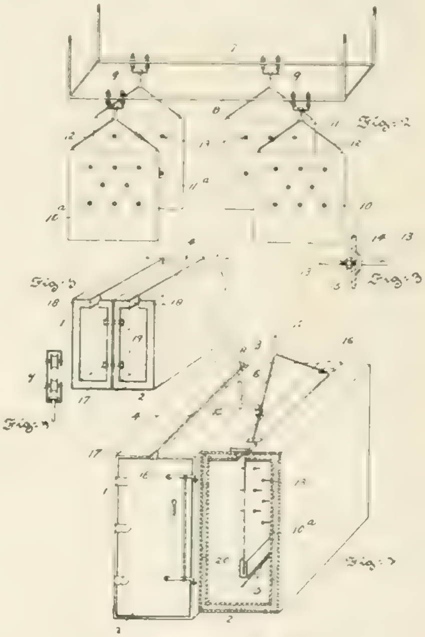
A New Form of Japanning Oven.

A new form of japanning oven has been patented by Calvin P. Bascom, of the Fayette R. Plumb, Inc., Company, the well-known makers of edge tools in Philadelphia Pa. (U. S. Patent 905,047, Nov. 24, 1908). The oven is herewith illustrated.

It consists of the regular oven used for baking japan, but with convenient devices for inserting and removing the tools that are japanned. Referring to the illustrations, the details are as follows:

Figure 1 is a perspective view illustrating the oven and showing some of the parts removed. Fig. 2 is a similar view illustrating parts of the apparatus shown in Fig. 1. Fig. 3 is a sectional view illustrating a detail of construction. Fig 4 is a view illustrating another detail of construction, and Fig. 5 is a view illustrating one of the end frames of the oven.

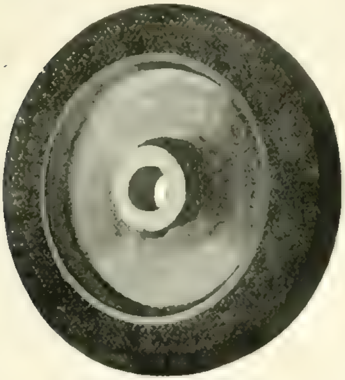
In use, one of the carriers is placed in each of the two ovens and the other two carriers are outside of the ovens. Upon the pins of the carriers which are in the ovens are suspended tools, the japan upon which is being baked and tools which are to be baked are being hung upon the pins of one of the other carriers and finished tools are being taken off of the other carrier. For this purpose the carriers may be turned about their swivels so that the operator may have access to the pins on each of their faces. The operator may first put upon the proper carrier the tools which are to be baked and then remove those which have been baked from the other carrier, and this may be done while two of the carriers are in the oven so as to have the tools which they carry baked. When the carriers are to be moved the plates 16 are removed and these plates are applied so as to confine the heat during the baking operation just as the doors 3 are closed during the baking operation and are opened to permit of the movement of the carriers. In this way the operator may hang tools upon one of the carriers, remove tools from the other of the carriers while tools are baking at different stages of completion on the other two carriers and by repeating these operations with the various carriers in rotation practically none of the attendant's time is lost.



A New Japanning Oven.

The "Springfield" Polishing Wheels.

The Springfield Tire & Rubber Co., of Springfield, Ohio, are placing upon the market a line of polishing wheels of a different character from anything yet manufactured. The polishing wheels are made partly of rubber, and partly of an abrasive. In this manner a flexible wheel is obtained which conforms to irregular surfaces. They are used for polishing cutlery, castings, springs, sheet metal or any work with irregular surfaces.



The "Springfield" Polishing Wheel.

One of the particular values of this wheel lies in the fact that any abrasive may be used with the rubber and thus obtain a cutting surface that may be adapted to any requirement. In the case of a glued wheel, carborundum, for example, cannot be successfully used on account of its glassy nature, which prevents its adhesion. As well known, carborundum, is only exceeded in cutting power by the diamond, and it is particularly valuable in polishing hard steel. When used with rubber in the "Springfield" wheel, however, it is bound so firmly that an excellent polishing surface is obtained.

These wheels are made in a large number of varieties to suit all polishing requirements, and those who carry on polishing will do well to investigate their economy and merit. They are made in either solid wheels, or those with an iron center, and one of the latter is herewith illustrated.

A New Apparatus For Making Lead Traps.

A new form of apparatus for making lead traps by hydraulic pressure has been invented by Giuseppe Mereta of Genoa who is connected with a company in that city which manufactures lead pipe. The apparatus is herewith illustrated. Figure 1 is a general view of the complete apparatus, Fig. 2 a sectional plan, Fig. 3 a vertical section, and Fig. 4 a detail view of the special valve gear for the liquid under pressure.

As will be seen on examining the drawings, the lead chamber is constituted by a chamber proper, inner core or die —*e*— and a removable ring —*d*— for regulating the thickness of the trap.

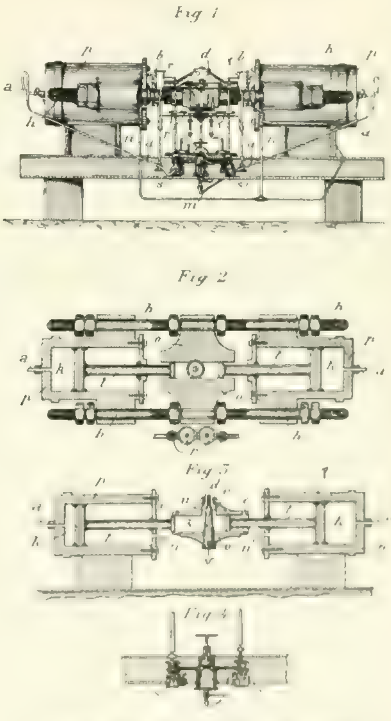


Fig 1

Fig 2

Fig 3

Fig 4

Apparatus for Making Lead Traps.

The object of the use of the inner core —*e*— is (*a*) to facilitate the making of traps [illegible] curves and (*b*) to [illegible] the [illegible] of the residue of lead when it is desired to remove the core [illegible]. The inner core —*e*— is tapered and is arranged in the lead chamber where it is held in place by a [illegible] and key —*i*—. The said core is provided with two grooves —*u*— through which on being forced by the pistons —*t*—, the lead rises to the center of the lead chamber —*d*—. Opposite the centers of the pistons —*t*—, a hole —*z*— is provided in the core *e* for the purpose of being used as a supply and compensation hole.

The lead chamber is provided with two holes —*c*— (Fig. 3) for introducing the lead.

The valve gear shown in detail in Fig. 4, serves to facilitate the regulation or change of pressure in the cylinders —*p*—. It is constituted by two valves —*s s'*— the spindles of which are joined together by means of a system of toothed wheels—*r*—and operated by means of cranks —*r'*—. The use of toothed wheels offers the very great advantage of enabling the opening and closing of the said valves to be regulated from a maximum to a minimum.

The operation is as follows: As soon as the lead chamber has been properly heated lead is introduced through the holes *c*, and as soon as the lead has solidified, the manufacture begins. If the valves —*s s'*— are left uniformly open, the result will be that a straight pipe will come out from the orifice of the lead chamber for both pistons will uniformly advance toward the core *e*. But if one of the valves, for instance —*s'*—, is closed, the pipe will be bent towards the side of the closed valve as only the piston *t* will then advance.

The supply and the compensation take place in the following manner. If the right hand piston —*t*— is cut off and consequently standing still, while the left hand piston continues to work, a small portion of the lead, instead of escaping through the groove—*u*—on the left hand side of the core, will pass through the hole —*z*—, and as it will meet the fixed right hand piston, it will supply the inner curve of the trap curvature through the groove —*u*— on the right hand side of the core. As it is impossible to maintain the lead chamber —*o*— at a constant temperature up to one-tenth of a degree, and the lead could be more or less liquid according to the degree of heat, it follows that, in order to obtain curves or bends not only always equal, but also more or less wide, the two cylinders must be provided each with a discharge valve —[illegible]— the working of which is as follows: If the right hand piston is cut out, that is to say, standing still, and the left hand one exercises a pressure, if the supply hole *z* admits an excessive quantity of lead, so that the inner curve becomes too wide, and if the discharge valve of the cylinder is opened to a greater or less extent, it will follow that, under the effort of the left hand piston, the lead supplied through the hole *z*, instead of rising through the right hand groove of the core *e*, will force the right hand piston back, so that the supply through the right hand groove failing, the curve will become narrower.

The driving power required for working this machine is about 2 HP for 180 atmospheres with lead at a temperature of 150 degrees.

A New Brightener For Electrogalvanizing.

A new brightener for electrogalvanizing solutions has been patented by Edward C. Broadwell of Chicago, Ill. It consists of zinc naphthalene disulphonate. It is claimed that it is cheaper than oxalic acid, tartaric acid or citric acid frequently employed.

The zinc naphthalene disulphonate is made as follows: The necessary quantity of naphthalene and sulphuric acid are mixed (in molecular weights of each) and zinc is dissolved in the solution.

The inventor claims that the quantity used in the electrogalvanizing solution may vary within wide limits. The zinc napthalene disulphonate is added to the regular solution of zinc sulphate in water used for electrogalvanizing. In addition, the inventor states, a small quantity of aluminum sulphate is used. Cheapness seems to be one of the features of the invention.

The Production of a White Silver Deposit.

It is not an uncommon thing in many plating establishments that do not make a regular business of silver plating, to find a freshly silver plated article with a very yellow color. This is particularly true of many job shops in which silver plating is seldom done, and in which much economy is practiced. In the establishments which manufacture silver plated ware, a silver deposit of this nature would not be tolerated for a moment, but the difficulty would at once be remedied. In fact, it is extremely rare that a yellow deposit is ever produced, and if it is something is radically wrong. A good silver deposit is pure white.

The principal cause of the yellowness in silver deposits is the use of too strong a current so that the deposit is "burnt." In addition to this the solution usually contains too much free cyanide. This is almost invariably the case in job plating establishments as they are apt to economize on silver anodes. The result is the exhaustion of the silver from the solution and the increase in the free cyanide. One establishment, in which economy is carried to excess, uses a silver dollar for an anode in a twenty-five gallon solution. It is needless to say that the quality of their work is not up to the standard.

If a white silver deposit is desired, and this is the only kind that is suitable for burnishing and high grade work, care must be taken to keep a good quantity of silver in the solution and avoid the presence of an excessive quantity of free cyanide. The current for the best work should not exceed a tension of one volt.

Using Copper Ingots as Anodes.

By Joseph Farwell.

In these days of high-priced copper every one is searching for methods in which economy may be practiced. In the establishment with which I am connected, both a brass foundry and plating room are a part of the shop. One is supposed to work in harmony with the other. I will admit that when a poor lot of castings, full of pin holes, are received in the plating room, that "harmony" is not just the word to express the situation.

Our brass foundry foreman talked to me for so long a time about the purity of "refined copper," that I was tempted to try an ingot as an anode. The ingots now come on the market with only one "neck" which facilitates their use.

At first, I experienced difficulty in holding the anodes in the bath. I finally arrived at the following method which has given me good results:

Referring to Fig. 2, the sketch, a hole is bored in the top of the ingot E. This hole H may be of any desired depth, but usually about half an inch is used. A copper rod is soldered in this hole. This rod B is bent at the top in the form of a hook so that it will fit over the connecting rod. The base of the rod C is covered with a good layer of solder, and on this a lead pipe D is placed. This pipe need not be soldered at the top but should be at the bottom so that no liquid can enter the space around the copper rod. The lead pipe protects the copper rod from corrosion.

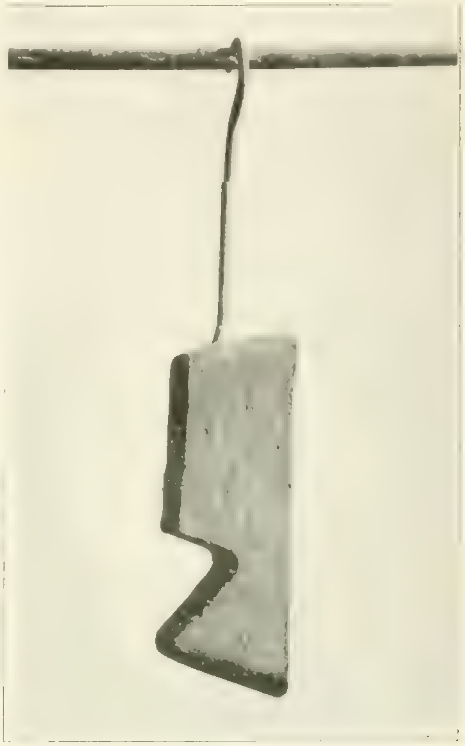


Fig. 1. Copper Ingot Used as an Anode.

The ingot is hung in the manner shown in Fig. 1, so that the solution is above the top of the ingot. The lead pipe and the solder protect the rod so that it is not attacked by the plating solution. The ingot is sufficiently heavy so that it presses good contact on the anode rod and thus forms a good connection.

I will admit that the anode thus made does not dissolve as evenly [illegible] a well cast one or the ordinary [illegible]. One difficulty is the cutting through of the ingot at AB. I allow the anode to remain in the bath until nearly cut through at this point, and then break off the lower part and send it back to the foundry. When the top part is pretty well gone, I also send that back. The ingot is apt to be full of blowholes which cause the pitting of the surface. The fact that the ingot can be used in our foundry results in no loss at all.

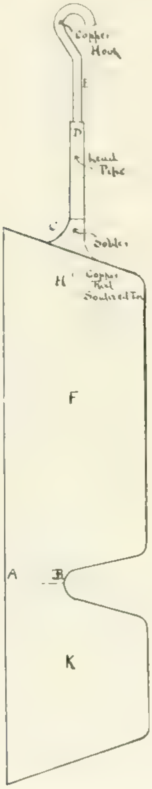


Fig. 2. Sketch Showing Manner of Fastening Hook.

Copper ingots are the cheapest form of copper that can be purchased, and they are also very pure. I am able, therefore, to save at both the "spigot" and the "bunghole." Were it not for our brass foundry, however, I fear that copper ingots could not be used in the plating room.

In making alloys, the metals with the highest melting point should be melted first, and those which melt at a lower temperature added last.

The Electrical Conducting Power of Substances.

Conductivity is the opposite of resistance. A good electrical conductor has a low resistance. A poor conductor has a high resistance. An insulator has a very high resistance, although it does not offer complete resistance towards the passage of electricity. There is nothing which is an absolute non-conductor.

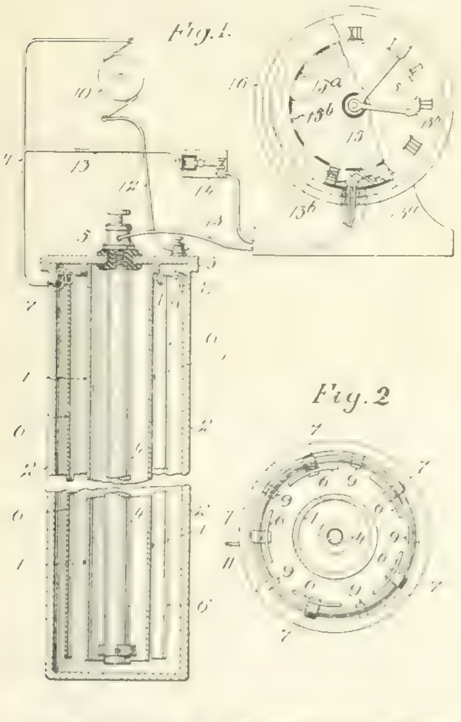
The following table, after Gore, will serve to illustrate the relative conductivity of various materials. The table begins with the poorest conductors such as ebonite and shellac and ends with the best, or the ductile metals, such as gold, silver, copper, lead, tin, etc.

1. Ebonite.
2. Shellac.
3. Pure rubber.
4. Gutta-percha.
5. Amber.
6. Rosin.
7. Sulphur.
8. Wax.
9. Agate.
10. Glass.
11. Gems.
12. Silk.
13. Wool.
14. Hair.
15. Feathers.
16. Dry paper.
17. Leather.
18. Porcelain.
19. Camphor.
20. Chalk.
21. Lime.
22. Dry gases.
23. Dry steam.
24. Phosphorus.
25. Fatty oils.
26. Metallic oxides.
27. Ice.
28. Straw.
29. Paper.
30. Marble.
31. Dry wood.
32. Alcohol or ether.
33. Rain-water.
34. Spring-water.
35. Sea-water.
36. Graphite.
37. Brittle metals.
38. Ductile metals.

This table indicates only the order of electrical conductivity and not the relative quantity. The actual difference, however, between the conductivity of a metal and a non-metallic substance may be appreciated when it has been found that if the resistance of silver be taken as 1, that of gutta-percha would be 850,000,000,000,000,000,000.

A Method of Electrogalvanizing Iron Pipes.

In the use of galvanized iron pipes, the necessity frequently arises for giving the interior of the pipe a deposit of less thickness than the outside in order to economize on zinc. In hot galvanizing this is impossible from a commercial standpoint, but in the electrogalvanizing process it can be accomplished by allowing the current to flow through the anodes which take care of the outside of the pipe for a greater length of time than it does through the inside.



Automatic Device for Electrogalvanizing Pipes.

If this operation, however, is done by hand, much time is spent in looking after the switch which is needed for adjusting the current. Geo. A. Lutz, of Plainfield, N. J., has invented a method (U. S. Patent 902,892, November 3, 1908) which allows this alteration of current flow to be made automatically. It is done in the following manner.

The current passes through a clock supplied with contact points so that when a certain predetermined time has elapsed, the current is stopped from passing through the anode on the interior and flows only through the exterior anodes. The hands of the clock dial may be set to any desired time so that the deposition of the zinc may take place in any desired proportion on the inside or outside

A New Process For Producing Metallic Silicon.

A new process for producing metallic silicon has been discovered and patented by Frank J. Tone, of the Carborundum Company of Niagara Falls, N. Y. It consists of heating 222 parts of kaolin and 48 parts of ground coke together. The mixture is heated in an electric arc furnace, and the amount of carbon present is only sufficient to reduce the silica to silicon, while the alumina is not reduced, but fuses, and may afterwards be used as an abrasive.

After the mass has been cooled, the silicon is found on the surface of the molten alumina on account of its less specific gravity, and after cooling, may be removed by hand, or the whole mass ground and the alumina and silicon separated by concentration. The silicon thus prepared, the inventor says, can be used in the refining of steel, iron or copper, or in the reduction of refractory ores.

A high polish on nickel plated articles may be obtained by tumbling them with leather and dry Vienna lime. In this manner nearly as good a finish as that produced by buffing may be obtained.

Brass can be silvered by soaking it in a solution of nitrate of silver until yellow, and then exposing to the sunlight until it becomes black. Rubbing or burnishing will then bring out the lustre of the silver.

Questions and Answers.

QUESTION No. 572. We want some information in regard to the refining of very fine dirt from our brass foundry. This dirt contains 15.6 per cent of copper by chemical analysis, and on account of its fineness and large percentage of silica it would be difficult to smelt in our cupola which we use. The blast would tend to blow it out, and a large quantity of flux would be needed to combine wth the silica. What would be the most economical method of refining this material so as to get out the metal?

Answer. You cannot smelt fine material of this kind in a cupola without first converting into briquettes as the blast would blow it out. The fine material is mixed with slacked lime and formed into briquettes of any suitable size by means of a briquetting machine. Such briquettes are usually about 2 inches in diameter and 1 inch in thickness. They are dried and are ready for charging. The lime acts as a flux and the shape of the briquettes is such that they do not clog the cupola. You will not find it profitable to smelt alone material containing so little copper, as it will take so much heat and flux to slag off the foreign matter that the profit will be absorbed. It is customary to mix a richer material so that the average of the two is brought up to a content of about 40 per cent of copper.

QUESTION No. 573. What is a good formula for an electric cleaner?

Answer. While an electric cleaner containing cyanide usually gives the best results, it is rather dangerous to use on account of the spray thrown up during the cleaning. If a strong exhaust fan is used, the danger is minimized, but few platers have it. A solution containing equal parts of caustic potash or caustic soda, and sal soda is now used in many establishments. It should stand about 12 or 15 degrees Beaume and is used hot. A current of 10 or 12 volts cleans quite rapidly, although less can be used if necessary. The cleaning is then slower. The work to be cleaned is used as the cathode and *not* the anode.

QUESTION No. 574. We send you a small casting of brass that has been dipped. You will notice the surface is not bright, but mottled and dull. What is the difficulty?

Answer. The surface of the casting looks as if you had too much oil of vitriol in the dip. Try equal parts of oil of vitriol and aqua-fortis, and we believe you will have no trouble. Add an ounce of common salt to 2 gallons of the dip and it will serve to brighten the surface.

QUESTION No. 576. Can steel be brass plated without the use of the electric current? We have some steel springs to make and the sample has the appearance of a poor brass, and yet we know it has not been electroplated.

Answer. You cannot brass plate steel without the use of the current. The spring has probably been coated with a yellow lacquer so that it resembles brass.

QUESTION No. 575. What is the best mixture to use in making soft metal hammer?

Answer. A good mixture for this purpose is the following:

Tin	96 lbs.
Antimony	8 lbs.
Copper	4 lbs.

Do not add any lead to the mixture. It causes brittleness.

QUESTION No. 577. I am interested in the manufacture of casket hardware, and would be pleased to know if there are any publications on the subject which treat from the molding to the silver plating of it.

Answer. No books have ever been published on this subject. The silver plating, however, is treated in text books on the art of electroplating. The metal of which the casket hardware is made is an alloy of lead and antimony, containing 13 per cent of antimony, as this mixture has been found the best for the purpose. It is cast in bronze molds, and surfaced, if necessary, and then given a light nickel deposit. The use of the nickel prevents the subsequent light coat of silver from soaking into the base metal. It is well known in the electroplating trade that if a light silver deposit is put directly on a soft metal base it will finally soak in and disappear from sight. Nickel does not do this. After the nickel has been deposited the article is given a light silver deposit in a bright silver solution (i. e., one containing a small quantity of bisulphide of carbon to produce a bright deposit) and then buffed with a soft rag buff with lampblack. As a usual rule coffin hardware is not lacquered.

QUESTION No. 578. In making trolley car castings it is desired to obtain a composition of the following:

Copper	84 lbs.
Zinc	10 lbs.
Tin	3 lbs.
Lead	3 lbs.

How much metal should be put into the crucible to obtain 100 lbs. of this mixture? In other words, what is the respective shrinkage on each of the above metals, that is, using new metals entirely?

Answer. You should be able, by careful work, to melt your mixture with half a per cent. shrinkage but you will undoubtedly find it difficult, with the average brass foundry labor, to obtain it in actual practice. Ordinary foundry practice on this material, using new metal and a small amount of scrap will show a shrinkage of from 1 to 1½ per cent. Some of this metal, of course, is recovered in the ashes and skimmings.

QUESTION No. 579. In making a new nickel solution, should the salts be dissolved in hot or cold water? If hot water is used, what is the advantage besides the saving in time?

Answer. Hot water is used only to hasten the dissolving of the nickel salts. They dissolve somewhat slowly in cold water, and if one is in a hurry too long a time is consumed. The use of hot water has no other advantages, nor are the nickel salts affected in any way.

QUESTION No. 580. What can be used for brazing bronze castings? These castings run about 85 per cent. of copper and 15 per cent of tin, and in some cases a small percentage of zinc. We have no difficulty in brazing steel. but the melting point is so high in the case of the brazing solder that we cannot braze the bronze.

Answer. Ordinary brazing solder consists of equal parts of zinc and copper, but the melting point is so near that of the mixture you mention that you cannot braze it successfully. The only solder that could be used for such a purpose is a silver solder. The melting point of this is lower than that of the spelter solder (ordinary brazing solder), and if you cannot use this you will be obliged to give up the job. At the best, a bronze of the mixture you mention is quite difficult to braze, even with a silver solder of quite low melting point.

QUESTION No. 581. We have been having considerable trouble with our tin crystals used in tinning by the cream of tartar process, and wish to ask what makes good crystals of this material. What material is used for adulterating it?

Answer. Your tin crystals (chloride of tin) might be adulterated with any foreign matter that is yellowish-white, such as clay or silica, but if it is done it has never come to our notice. Your material is probably dried out too much by exposure to the air, or in process of manufacture, so that a basic chloride of tin is formed which does not dissolve readily in your tinning solution. This is a very frequent occurence, and the addition of a very small quantity of hydrochloric acid to the tin crystals when dissolved in water will usually clear it up. If the tin crystals do not dissolve in water with the formation of a clear solution, it does not indicate that they are impure. The basic chloride of tin that is produced by exposing the crystals to the air, or by evaporating them too far in making them, is insoluble in water and leads one to believe that they are adulterated. Tin crystals, or chloride of tin, as they are called in chemistry, are made by dissolving metallic tin in strong muriatic acid and evaporating until nearly dry. When of good quality they should be slightly moist, of a yellowish color, and resemble a crust of light brown sugar.

QUESTION No. 582. Is there any [illegible] difference in the meaning of the terms zinc and spelter? We know that they are used indiscriminately in the metal trade, but it has occurred to us that possibly one might have a slightly different meaning from the other.

Answer. As far as known, the meaning of zinc and spelter is identical. They are used in the metal trade indiscriminately. There is, however, a growing tendency to designate the refined metal as *zinc* and the common grade as *spelter.*

QUESTION No. 583. I am having trouble with my cyanide copper solution. I have always made it up with carbonate of copper and cyanide without difficulty, but now I cannot dissolve all of the carbonate of copper. It settles in the bottom of the tank and the solution is green. I can obtain a copper deposit, but the anodes coat over in a short time and stop the passage of the current.

Answer. You have undoubtedly obtained some carbonate of copper that is dry and hard, although from your description it is indicated that you have not used enough cyanide. A cyanide copper solution when good should have the color of ale, and when green or blue shows that more cyanide is needed. The fact that your anodes coat over also demonstrates that you have used too little cyanide.

QUESTION No. 585. We have a great deal of trouble in producing a bright brass plate on some steel brackets that we are making. These brackets are made of rolled steel and wire, and are somewhat rough. We have tried tumbling them [illegible] after brass plating them, but [illegible] success. The brackets [illegible] came out very scratchy. It seems to us that there must be some [illegible] so as to render them bright. What we want is a bright brass deposit so that the brackets will resemble brass.

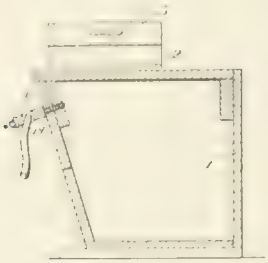
Answer. The shape of your brackets is such that you will not be able to [illegible]. It is unsuited for such treatment. You may produce the bright deposit in two ways. First, by the use of a small quantity of arsenic in your brass solution. This will make the brass deposit more bright, but is best suited for light deposits. [illegible] to run dull as the deposit increases in thickness. Secondly, by giving the brackets a rather heavy brass deposit and then running them through a bright dip. The brass deposit must be of good thickness [illegible]

QUESTION No. 586. [illegible]

Answer. [illegible] melting [illegible]

Patent Abstracts.

[illegible] Dec. 8, 1908. MOLDING APPARATUS. Frank Kreger, of Cleveland, Ohio.

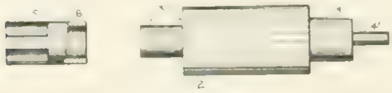


A vibrator of new design for use in hand molding. The vibrator is attached to the molding bench and is operated by the knee.

906,202, Dec. 8, 1908. COMPOSITION FOR WELDING COPPER. James Crew of Charleston, W. Va. A mixture of borax 10 parts; carbonate of iron, 8 parts; and alum 3 parts. It is used as a flux in welding copper and is applied to the points when heated and ready for welding.

905,558, Dec. 1, 1908. MAKING COMPOUND METAL INGOTS. John F. Monnot, of New York. Assignor to the Duplex Metals Co., of the same place. A method and apparatus for making copper coated steel billets by immersing them in molten metal while highly heated, and then in another mass of metal at a lower temperature. The features of this patent lie mainly in the apparatus employed.

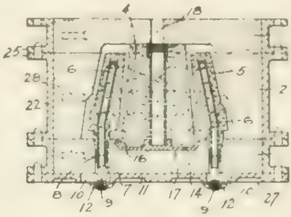
905,857, Dec. 8, 1908. MANUFACTURE OF ROLLS. Evan Edmunds and John H. Pendleton of Pittsburg, Pa. The wabbler or



pinion on the end of the roll is made separately and brazed on the roll. In case of breakage, a new one may be put on thus saving the roll from the scrap heap.

906,268, Dec. 8, 1908. MOLDING MACHINE. G. A. Oertzen, of Dusseldorf-Oberkassel, Germany. This machine is provided with two opposed molding plates, each containing a pattern section. By means of a rotary ramming device the patterns are pressed into the sand and mechanism allows the parts of the flask to be turned over when the ramming is completed.

[illegible], Dec. 15, 1908. SAND MOLD AND FLASK THEREFOR. William D. Berry, of New Brighton, Pa. Assignor to the Brighton Brass & Bronze Co., of the same place. A flask and method of making a mold in which water-cooled blast furnace tuyeres are cast. The flask and core are so constructed, that

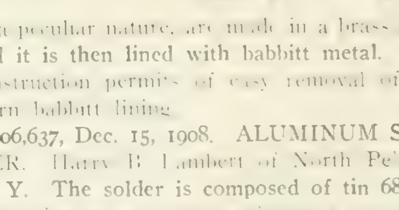


unskilled labor can be employed in making the mold.

906,937, Dec. 15, 1908. ALLOY, Walter Rubel, of Hamburg, Germany. An alloy of iron, nickel and vanadium, which can be hardened in a current of cold air.

906,383, Dec. 8, 1908. SOLDER FOR ALUMINUM AND OTHER METALS. Chas. G. Carroll and Wm H. Adams of Fayetteville, Ark. The solder consists of tin 47½ lbs.; lead 47½ lbs., and calcium 5 lbs. It is claimed that the calcium reduces the oxides of the metals on the surface to be soldered.

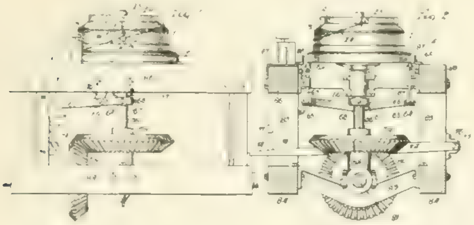
904,634, Nov. 24, 1908. JOURNAL BEARINGS FOR CARS AND OTHER AXLES. John E. Muhlfeld, of Baltimore, Md. A composite journal bearing composed of recesses



of a peculiar nature, are made in a brass shell and it is then lined with babbitt metal. The construction permits of easy removal of the worn babbitt lining.

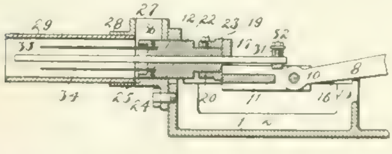
906,637, Dec. 15, 1908. ALUMINUM SOLDER. Harry B. Lambert of North Pelham, N. Y. The solder is composed of tin 68 per cent.; zinc 29 per cent.; antimony 2 per cent.; and phosphorus 1 per cent. These are mixed and poured into bars. The soldering is done in the usual manner.

905,077, Nov. 24, 1908. WIRE DRAWING BLOCK, Harry B. Humphrey, of Joliet, Ill. The feature of this wire drawing block lies in the use of a gripper for gripping the wire as it issues through the wire die. It is made so that the drum does not need to have a rise and fall.



906,339, Dec. 8, 1908. COMPOSITION OF MATTER CONTAINING ALUMNIA AND SILICA, Frank J. Tone, of Niagara Falls, N. Y. Assignor to the Carborundum Co., of the same place. By fusing clay with a proportion of carbon in an electric furnace, the inventor says it is possible to obtain reduced silicon and fused alumnina without reducing the aluminum to the metallic condition. The silicon is obtained as one product, and the alumina is in the form of a hard material quite suitable for abrasive purposes.

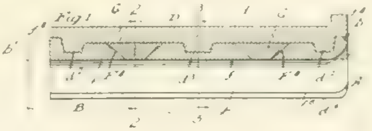
906,005, Dec. 8, 1908. CORE MAKING MACHINE, Fred. C. Francisco, of Cuyahoga Falls, Ohio. A core machine for making straight cores, and which has a device upon it for venting them. The machine is of such design that the venting is done at the same time that the core is made. The labor required, therefore, is of the unskilled kind, and is minimized.



904,836, Nov. 24, 1908. WIRE DRAWING MACHINE, Charles A. Carlson, of Kokomo, Ind. A drum for wire drawing, which has its discharge end lowermost. A truck carrying a reel of wire may then be placed underneath, and the reel raised to the drum.

907,274, Dec. 22, 1908. METAL DIPPING MACHINE, Charles F. [illegible], of Peru, Ill. A device for dipping a certain quantity of zinc from a melting pot for casting into slabs for rolling. The object is to dip a uniform amount each time and do away with hand labor.

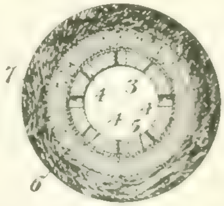
905,355, Dec. 1, 1908. BEARING, [illegible] Peckham, of Westminster, London, England. A journal bearing for use in cars and similar vehicles. It is made in two parts, so that a new shell may be inserted when desired. The arch of the shell is made thicker than the sides so that the wear is even. The top of a bearing has the greatest wear.



905,557, Dec. 1, 1908. ARC LIGHT ELECTRODE, Berthold Monasch, of Berlin, Germany. Assignor to the General Electric Co., of Schenectady, N. Y. An arc light electrode composed of titanium carbide of oxide, and a small quantity of silicon carbide, which prevents thickening by raising the fusion point of the mass.

905,009, Nov. 24, 1908. BRAZIER'S LAMP, James A. Shores, of Crowder, Okla. A brazing lamp, intended for jeweller's use, in which gasoline is used as the fuel. Various devices are used for controlling the flame and supply of fuel.

906,912, Dec. 15, 1908. PIPE CORE AND METHOD OF MAKING SAME, Charles W. McWane, of Lynchburg, Va. A method of making a soft core for casting pipes.



Green sand is formed around a core barrel, and over this loam is placed and the whole dried sufficiently to dry the outside only. In this manner a soft, dry sand core is obtained.

905,328, Dec. 1, 1908. MOLDING MACHINE, William C. [illegible], of Indianapolis, Ind. An appliance applied to a molding machine in order to [illegible] of the mold board. The [illegible] of the mold by an uneven [illegible] is thus avoided.

[illegible], Dec. 15, 1908. MACHINE FOR APPLYING SOLDER TO SHEET METALS, Samuel A. [illegible], of [illegible], Ill. Assignor to the American Can Co. A [illegible] automatically applies [illegible] the surface of tin [illegible].

Trade Items.

Owing to the heavy decline in the price of aluminum, the Aluminum Corporation, Ltd., at Conway, North Wales, has gone into the hands of a receiver.

P. N. Glenn of Gastonia, N. C., is contemplating opening a nickel and silver plating shop in that town, and would like catalogues and circulars pertaining to equipment.

The Blume Mfg. Co. of Passaic, N. J., manufactures of ormolu clocks and art metal wares, are to move their factory from that city to 397 Broad St., Newark, N. J.

The electroplating and polishing departments of the Snyder & Baker Stove Co., at Belleville, Ill., recently destroyed by fire, are being rebuilt and will shortly be ready for occupancy.

Gardner & Whipple, who have been carrying on sweep smelting and gold and silver refining on Calender Street, Providence, for some time, are to retire from business, and are now closing out their affairs.

The New Era Gas Engine Co., Dale Ave. and West 2nd St., Dayton, Ohio, manufacturers of gas and gasoline engines, have under consideration the starting of a nickel plating plant, and would like to hear from manufacturers of this class of material.

The Nelson Valve Co., of Wyndmoor, Pa., manufacturers of steam metal valves, are now building a new addition to their factory and when completed will commence the manufacture of radiator valves. A nickel plating plant will be installed.

The Frink Pyrometer Co., of Columbus, Ohio, is equipping a factory for the manufacture of the Frink pyrometer. The factory is located on North 3rd St. This pyrometer registers from 300 degrees below zero to 5000 degrees above, and is different from other types made.

The Syracuse Die Molded Casting Co. has been incorporated at Syracuse, N. Y., to make die molded castings of a high grade. The factory will be at 303 Wallace St. The castings will have the strength of brass and no machine work need be done upon them. The capital stock of the company is $10,000.

The location of the Waterbury Crucible Co., in Waterbury, Conn., the center of the brass industry in the United States, enables them to keep in close touch with all the requirements of the trade. They are, therefore, able to keep abreast of the times in crucible manufacture, and the success which has attended their efforts is very gratifying. They are now placing upon the market the "Waterbury Crucible Ring" which is used to generate greater and more uniform heat in the furnace and also acts as a protection in melting metals as chips or other fine material is not lost in introducing them.

The Midland Electric Co. of Des Moines, Iowa, has increased its facilities for the manufacture of gas and electric fixtures.

A new brass foundry is to be started in the spring by the Birchfield Experimental and Pattern Works, at Lansing, Mich.

Henderson Bros., of Waterbury, Conn., the well known makers of tumbling barrels, are to erect a new three-story addition to their plant.

R. Hamilton & Son has been organized at Brooklyn, N. Y., to manufacture brass castings and other brass goods. The capital stock is $12,000, and the office at 224 Hicks Ave.

The National Metal Seal Co. have commenced operations in their new factory at Deering Junction, near Portland, Me. This company operate a nickel plating plant for nickel plating their steel bottle seals.

The Page Woven Wire Fence Co., of Adrian, Mich., who have been making an electrogalvanized rural mail box, have now discontinued its manufacture, and offer their entire electrogalvanizing equipment for sale.

The Eberman-Bailey Brass Works has been formed at Jamestown, N. Y., to manufacture metal goods. A brass foundry will be erected. H. J. Eberman and J. A. Bailey, formerly of the Art Metal Construction Co. of that place, comprise the new concern.

The Goldschmidt Detinning Company has been incorporated in New York City with a capital stock of $3,000,000 to detin scrap tinplate under the Goldschmidt process. It is said that the American Can Company are interested in the company. The company is represented by F. H. Hirschland, 60 Wall St., New York City.

The Metal Dross Economy Co. has been organized at Bristol, Conn., to manufacture a device for recovering metal from brass skimmings. By means of the device it is possible to separate the charcoal from the metal and oxide, and use it over again. The clean metal is also removed and is easily reclaimed. A. L. Haasis is president and sales manager of the company, and W. H. Carpenter vice-president and manager. The office of the company is at Bristol, Conn.

The John R. Lyman Company, of Springfield, Mass., manufacturers and dealers in electroplating and polishing supplies, make a special grade of white rouge called "S. N. 4 White Rouge" which will not slack. This material has given excellent results wherever used and is particularly suitable for polishing white metals. This company also prepare other special grades of polishing material not heretofore made. They are also headquarters for buffs and all kinds of electroplating materials.

Morris R. Machol, American agent for "Magnalium," the alloy that is lighter than aluminum, has moved his office from 32 Park Place to 16 Beaver Street, New York City.

M. T. Goldsmith & Co., manufacturers of silver plated toilet sets, sterling-silver novelties, etc., are now occupying the factory at 103 Oliver St., Newark, N. J., formerly conducted by the late Frank [illegible].

On January 1st the Providence Brass Foundry and Machine Company took over the business of the Providence Brass and Aluminum Company. There is no change in the management or business. Joseph Lee is the proprietor of the company.

H. F. Carpenter & Son, of Providence, R. I., the well-known gold and silver refiners, are now putting on the market a green gold anode for use in depositing green gold, now so popular.

The Simplex Faucet Co., of Hyde Park, Mass., manufacturers of plumbers' brass goods, are to move to Bridgeport, Conn., where a factory has been obtained at 60 Silliman Ave.

The new brass foundry recently equipped at the plant of the Whitlock Coil Pipe Company, Hartford, Conn., has given them such excellent facilities for making brass, bronze and aluminum castings that they now solicit jobbing work in this line.

The Sandoval Zinc Company, 122 North Peoria St., Chicago, Ill., and with works at East St. Louis, Ill., have established a chemical department and are now placing upon the market chloride of zinc flux for use in soldering and as a flux in melting aluminum.

The Jonathan Bartley Crucible Company, of Trenton, N. J., are sending to their customers a unique souvenir in the shape of a stein made in the form of a crucible. The article is made of pottery, and the monogram of the company is enameled on the outside.

The Bristol Company of Waterbury, Conn., makers of recording instruments, manufacture pyrometers for every kind of service. For annealing, melting, lacquering, japanning, etc. special instruments are maufactured. The good results which follow the use of these instruments in the accurate determination of temperature is now being fully appreciated by the trade. For tinning and galvanizing the Bristol pyrometers are meeting with gratifynig success.

On January 1st the [illegible] Company took over the plant and business of the New England Refining Co., 7[illegible] Sabin St., Providence, R. I. They will engage in [illegible] and also will install a plant for the electrolytic recovery of gold from rolled gold plate waste. George [illegible] of the New England Refining Company is connected with the new company. Wm. [illegible] of the new company was formerly connected with [illegible] Stone & Co. Wm. [illegible] is a [illegible] jeweler.

The Standard Aluminum Co. has been organized at Wilmington, Del., with a capital stock of $1,500,000.

The Standard Emery & Polishing Wheel Co., of Springfield, Mass., are to move to Coxsackie, N. Y., where a building has been leased on Riverside Avenue. Increased facilities will be had for manufacturing.

The new plant of the Bridgeport Silverware Mrg. Co., of Bridgeport, Conn., on State St. extension, is nearing completion and will soon be ready for occupancy. Coffin hardware is the exclusive product of this company.

The Isaac G. Johnson Co., Spuyten Duyvil, N. Y., are now manufacturing valve stems of Monell-Metal, a nickel alloy, which are not only non-corrosive but strong. A number of the large steam goods manufacturers are using them for special work.

Owing to the increase in the demand for their aluminum castings, the Fairfield Aluminum Co., of Fairfield, Conn., manufacturers of high-grade aluminum castings of all kinds, have built an addition to their foundry and installed twelve melting furnaces in it. This gives them facilities for increasing their output and making prompt shipments on all orders received.

The Allyne Brass Foundry Co., of Detroit, Mich. (branch of the Cleveland company), have purchased the building formerly occupied by the Ford Motor Car Co. of that city, and which adjoins the plant of the Allyne Company. Additional foundry equipment will be installed and the manufacture of high grade plumbers' brass goods carried on.

Phelps, Dodge & Co., Inc., has been incorporated in New York City with a capital stock of $50,000,000 to take over the mining, other interests and business of the firm of Phelps, Dodge & Co. The following officers have been elected: President, James Douglas; vice-presidents, Cleveland H. Dodge, Arthur Curtiss James and James McLean; secretary and treasurer, George Notman. The directors comprise the above and George [illegible] E. Hayward Ferry, Francis L. Hine and Wm. Church Osborn.

The large variety of machinery manufactured by the Waterbury Farrel Foundry & Machine Co. of Waterbury, Conn., enables them to meet the demand of practically every branch of metal goods. They manufacture rolling mill machinery for [illegible] ver, sterling silver [illegible] familiarity with the brass rolling mill ind[illegible] In addit[illegible] small met[illegible]

The Buffalo Metal Furniture, Buffalo, N. Y., manufacturers of metal furniture, have purchased a site at Niagara and Bird Aves., and will erect a new plant on it.

The International Silver Company, of Meriden, Conn., manufacturers of plated and sterling silver ware have declared a quarter's dividend of one per cent on the preferred stock.

The plant and business of the Indiana Mfg. Co. at Richmond, Ind. has been purchased at a receivers' sale and the company reorganized with a capital stock of $50,000. The manufacture of brass beds will be continued as in the past.

The Standard Enamel Co., of Providence, R. I., have removed from 107 Friendship Street to 150 Orange Street. All kinds of electroplating will be carried on there and the manufacture of jewelry novelties commenced.

A new company called the Uniform Seamless Co. has been formed at Providence, R. I., to manufacture seamless plated wire and tubing. Joseph T. Boland, formerly superintendent of the United Wire and Supply Co. will be the superintendent of the new company. The company has not yet decided upon a location.

The S. Obermayer Company, of Cincinnati, Ohio, manufacturers of foundry supplies, are sending out to the trade an interesting series of postal cards on the evolution of the iron industry. These cards will be sent to anyone interested, and the first and second series have already been issued.

The price of aluminum has dropped in London to 16 cents a pound. It is stated that this price is practically what it costs to manufacture the metal. Owing to the duty on aluminum, the price has not yet been lowered to this figure in the United States. The increased production in Europe over the actual demand has brought about the condition.

Metal goods must be carefully preserved from tarnishing while in stock in order to preserve their value, and to wrap them in paper which will attack the metallic surface frequently results in a large loss. The "Star-Mills" Grass Bleached Tissue Paper, manufactured by C. H. Dexter & Sons, of Windsor Locks, Conn., is used by the leading manufacturers of silverware and plated goods in the United States. It is made particularly for this class of work.

The Rockwell Furnace Company, 26 Cortlandt St., New York City, has secured the services of Arthur L. Stevens, the well known industrial and furnace engineer and who will be closely associated with the company from now on. Mr. Stevens has given much attention to the metallurgical field, particularly with oil and gas furnaces, and he will follow this line of work in the production of economical, accurate and controllable furnaces for industrial purposes which the Rockwell Furnace Company are putting on the market.

The Automatic Typewriter Co. has been incorporated at Cleveland, Ohio, with a capital stock of $750,000 to manufacture a new typewriter operated by electricity.

The Pittsford Metal Ware Co. has been organized at Pittsford, N. Y., with a capital stock of $25,000 to manufacture specialties in metal ware.

The Ellsworth Company has rented the factory at 16 Boyden St., Newark, N. J., and will commence the manufacture of wireless instruments for the Radial Wireless Telegraph and Telephone Company.

The American Manganese Bronze Company, 99 John St., New York City, and with works at Holmesburg Junction Pa., are sending a circular to the trade describing the characteristics of their bronzes.

The G. W. Fleming Co., Bradford, Pa., manufacturers of machinery, plumbers' brass goods and brass fittings are to increase their capital stock to provide for additions to their plant.

Oman & Johnson of Willmar, Minn. have been absorbed by the Oman & Johnson Company and the manufacture of brass castings, machinery and iron castings will be carried on. G. Erickson will have charge of the foundry.

The Engineers' Specialty Co., of Kansas City, Mo., has taken over the business of the Armstrong, Menczer Mold & Metal Co., of that city, and the Ray Filter Co. of Wichita, Kansas, and expect to erect and operate a plant for manufacturing lubricators, metallic packing and water purifiers.

N. B. Ippilito, plater for the Pittsburg Lamp and Brass Co., of Pittsburg, Pa., has invented a new non-explosive lamp that can be used with gasoline, if desired, without danger of explosion. His address is 322 Emerson Place, Pittsburg, and he is shortly to place it upon the market.

The receivership of the Pope Mfg. Co. has terminated and a new company has been incorporated with the same name, under the laws of Connecticut. The old company was incorporated under New Jersey laws. The manufacture of automobiles and bicycles will be carried on as heretofore. Plants have heretofore been operated in Hartford, Conn., Westfield, Mass., Hagerstown, Mr., Toledo, Ohio, and elsewhere, but some of the plants will be sold.

The "Reinhold No flux Aluminum Solder," that is now being placed on the market by the Electrical Maintenance & Supply Company, 200 Market St., Newark, N. J., has met with gratifying success. Every user of aluminum will find it of advantage, and as no flux is used, no difficulty at all is experienced in soldering with it. The company supply sample bars and desire agents among the metal trades. The Electrical Maintenance & Supply Company are also special agents for Dr. O. Fr. Reinhold's non electric aluminum plating process.

The Security Lightning Rod Co., of Burlington, Wis., have increased their capital stock from $50,000 to $100,000.

The Wonder Automobile Co. has started the manufacture of automobiles at 4116 Penn St., Kansas City, Mo.

The Meiling Safe Company, of Toledo, Ohio, safe manufacturers, will move to Monroe, Mich., and build a new plant.

The Sanitary Appliance Co. has been incorporated at Neenah, Wis., with a capital stock of $25,000, and will manufacture plumbing and similar specialties.

The receivers of the Westinghouse Electric & Mfg. Co., of Pittsburg, Pa., have been discharged and the reorganization of the company completed.

The Merit Metal Co. has been incorporated at Paterson, N. J., with a capital stock of $120,000 to manufacture bearing metals. The office is at 367 Strait Ave.

Robert J. Taylor, Inc., 19th and Callowhill Streets, Philadelphia, Pa., are sending to the trade copies of a useful calendar and their price list of crucibles and graphite products.

M. F. Williams & Co., of Providence, R. I., manufacturers of jewelry, have moved from 99 Stewart St. to 409 Pine St. This firm is now making a specialty of hard enameled goods.

The Enoch Electric Co. has been organized at St. Paul, Minn. to manufacture telephones and other electrical goods. A site has not been selected, but this will shortly be done and manufacturing commenced.

Albert A. Moers, 24 and 26 Stone St., New York City, dealer and exporter of old and new metals, acts as American representative of N. Levy & Co., of Berlin, Germany, who are exporters and importers of old and new metals of every description.

The Techno-Chemical Co., of Cleveland, Ohio, are sending out a booklet describing the character of their "Techno-N. F. Alloy." This alloy is compounded by the Bechtold process, and is in the form of a metallic powder. One pound is used to each 100 lbs. of metal. When used on brass, bronze and gun-metal it cleanses them, increases their fluidity and gives greater strength and elongation. The grain of the metal is also made closer. This alloy has been a secret for over eleven years.

The Industrial Instrument Co., recently incorporated under the laws of Connecticut, with a capital stock of $200,000, has taken over the business of the Standard Gauge Company, of Syracuse, N. Y., and the Standard Electric Time Company, of Waterbury, Conn. The plant formerly occupied by Schaeffer & Budenberg at Foxboro, Mass., has been purchased and the company is to engage in the manufacture of recording and registering instruments. Bennett B. Bristol is the president, vice-president, Walter W. Patrick secretary Henry P. Dennis, and treasurer, Arthur F. Mundy.

The Bannatyne Watch Co., of Waterbury, Conn., manufacturers of cheap watches, have leased the plant formerly occupied by the Cross & Spiers Co.

John F. Schrink & Son. manufacturers of gold rings, at 67 Hamilton St., Newark, N. J., are to erect a new building at Emmett and Mulberry Sts.

The Foster-Glidden Vacuum Cleaning Co., of Chicago, Ill., has decided to locate at 63 Chandler St., Buffalo, N. Y. Vacuum cleaning apparatus will be manufactured.

A new factory will be built by the Strubler Computing Scale Company, of Elkhart, Ind. A location has not yet been found, but will probably be in that city.

The new building of the Fulton Metal Co., 296 and 298 Fulton St., Brooklyn, N. Y., smelters and refiners of old metals, is practically completed. Increased facilities are now had.

The Apperson Bros. Automobile Company has been incorporated at Kokomo, Ind., with a capital stock of [illegible] to manufacture automobiles. This business has heretofore been conducted as a partnership. New buildings will be erected.

Personal.

H. C. Carpenter has been appointed assistant superintendent of the Seymour Mfg. Co., Seymour, Conn., manufacturers of rolled brass and German silver.

Wm. D. Martin, formerly of the Waterbury Rolling Mills, Waterbury, Conn., is now sales manager of the Waterbury Brass Goods Corporation of that city.

George T. Smith has been elected to the presidency of the Joseph Dixon Crucible Company, Jersey City, N. J., left vacant by the death of E. F. C. Young.

Joseph T. Boland, superintendent of the United Wire and Supply Co., of Providence, R. I., has resigned his position with the company, and will become connected with a new company in the same capacity.

Richard D. Unger, of the firm of Unger & Christl, manufacturing jewelers of Newark N. J., has become associated with his brother, Eugene Unger, in the firm of Unger Bros., 412 Halsey St., Newark, N. J., manufacturers of sterling-silver ware.

Obituary.

Adolphus Bavier, for more than twenty years general manager of the Waterbury Clock Co., died on Dec. [illegible] at the age of [illegible] years.

Edward F. C. Young, president of the Joseph Dixon Crucible Co., of Jersey City, N. J., died on Dec. 6th., at the age of [illegible]. He was one of the leading businessmen of Jersey City, and was largely instrumental in building up the company to its present magnitude.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Acetone, pure, 98/99	℔.	.22
Acid, Acetic, pure, 30%	℔.	.07
Acid, Arsenious (White Arsenic)	℔.	.20
Acid, Benzoic	℔.	.55
Acid, Boracic (Powder), pure	℔.	.12
Acid, Hydrochloric, see Acid, Muriatic		
Acid, Hydrofluoric, 30%	℔.	.04
Acid, Hydrofluoric, 50%	℔.	10
Acid, **Muriatic, 20**	℔.	.02
Acid, Muriatic, c.p., 20	℔.	.07
Acid, Nitric, 38	℔.	.05⅝
Acid, Nitric, 40	℔.	.05⅞
Acid, Nitric, 42	℔.	06¼
Acid, Nitric, c.p.	℔.	.08
Acid, Sulphuric, 66	℔.	.01¾
Acid, Sulphuric, c.p.	℔.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	℔.	.04
Aluminum, Sulphate	℔.	.06
Aluminum, Metallic, in ingots	℔.	.24
Aqua Fortis, see Acid, Nitric		
Ammonia Water (Aqua-Ammonia), 20	℔.	.04¾
Ammonia **Water (Aqua-Ammonia),** 26	℔.	.06¼
Ammonia Water, c.p.	℔.	.08
Ammonium Carbonate, lump	℔.	.15
Ammonium Chloride (Sal-Ammoniac)	℔.	.12
Ammonium Hydrosulphuret	℔.	.30
Ammonium Sulphate	℔.	07
Ammonium Sulphocyanate	℔.	.50
Amyl Acetate	gal.	1.85
Antimony	℔.	.08⅛
Antimony Chloride (Butter of Antimony)	℔.	.23
Arsenic, Metallic	℔.	.15
Arsenic, White (Acid Arsenious)	℔.	.20
Argols, White (Cream of Tartar)	℔.	.31
Asphaltum, Commercial	℔.	.05
Asphaltum, Egyptian (Bitumen)	℔.	.30
Benzine	gal.	.20
Benzol, Pure	gal.	.75
Bismuth, Metallic	℔.	1.75
Bitumen, see Asphaltum		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	℔.	.10
Borax Glass	℔.	.35
Cadmium, Metallic	℔.	1.00
Carbon Bisulphide	℔.	.10
Calcium Carbonate (Precipitated Chalk)	℔.	.10
Chrome Green	℔.	.50
Copper, Lake (carload)	℔.	.14⅝
Copper, Lake (cask)	℔.	15⅛
Copper, Electrolytic (carload)	℔.	.14⅜
Copper, Electrolytic (cask)	℔.	14⅞
Copper, Casting (carload)	℔.	14¼
Copper, Casting (cask)	℔.	14¾
Copper Acetate (Verdigris)	℔.	.35
Copper Carbonate, dry	℔.	.25
Copper Sulphate (Blue Stone)	℔.	.09
Copperas, see Iron, Sulphate		
Corrosive Sublimate, see Mercury Bichloride		
Cream Tartar, see Potassium Bitartarate.		
Cryolite	℔.	.12
Cyanide, see Potassium Cyanide.		
Dextrin	℔.	.15
Emery Flour	℔.	.04
Emery, F F & F F F	℔.	.03
Flint, powdered	℔.	.01
Fluor Spar	℔.	01¼
Fusel Oil	gal.	1.75
Gelatine, Nelson's	℔.	1 15
Gold Chloride	dwt.	.60
Gum Copal	℔.	.30
Gum Damar	℔.	30
Gum Elemi	℔.	.70
Gum Guaiacum	℔.	.26
Gum Mastic	℔.	.70
Gum Sandarac	℔.	.35
Gum Shellac, brown	℔.	.50
Gum Shellac, white	℔.	.60
Iron Perchloride	℔.	.25
Iron Sulphate (Copperas)	℔.	.05
Lead Acetate (Sugar of Lead)	℔	.15
Lead, Pig	℔.	.04⅜
Lead, Red	lb.	.12
Lead, Yellow Oxide (Litharge)	℔.	.12
Liver of Sulphur, see Potassium Sulphide.		
Manganese, Ferro, 80%	℔.	.10
Manganese, Metallic, pure	℔.	.75
Magnesium, Metallic	℔.	1.50
Mercury Bichloride (Corrosive Sublimate)	℔.	.93
Mercury, Metallic (Quick Silver)	℔.	.89
Mercury Nitrate	℔.	1.50
Mercury Oxide, yellow	℔	1.80
Nickel and Ammonium Sulphate (Double Salts)	℔.	.16
Nickel Carbonate, dry	℔.	.60
Nickel Chloride	℔.	.50
Nickel, Metallic	℔.	.47
Nickel Sulphate (Single Salts)	℔.	.25
Nitre (Saltpetre), see Potassium Nitrate.		
Oil, Palm	℔.	.08
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	℔.	.15
Pearlash, see Potassium Carbonate.		
Phosphorus, yellow	℔.	.40
Phosphorus, red	℔.	1.10
Pitch	℔.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	12 50
Platinum Metallic	oz.	23.50
Potash by Alcohol, in sticks	℔.	.50
Potash, Caustic (Potassium Hydrate)	℔.	.08
Potassium Bichromate	℔.	.14
Potassium Bitartarate (Cream of		
Potassium Carbonate (Pearlash)	℔.	.10
Potassium Chlorate	℔.	.15
Potassium Cyanide	℔.	.25
Potassium Iodide	℔.	2.25
Potassium Nitrate (Nitre or Saltpetre)	℔.	.10
Potassium Permanganate	℔.	.17
Potassium, Red Prussiate	℔.	.60
Potassium, Yellow Prussiate	℔.	.24
Potassium Sulphide (Liver of Sulphur)	℔.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	℔.	.70
Tartar)	℔.	.31
Pumice, Ground	℔.	.05
Quartz, Powdered	℔.	.01
Rosin, Yellow	℔	04
Sal-Ammoniac, see Ammonium Chloride.		
Sal Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Metallic	oz.	.48
Silver Nitrate, crystals	oz.	.50
Soda Ash	℔.	.05
Silver, Fine	oz.	.50⅛
Sodium Biborate, see Borax.		
Sodium Bisulphite	℔.	.15
Sodium Carbonate (Sal-Soda), crystals	℔.	.02
Sodium Hydrate (Caustic Soda)	℔.	.05
Sodium Hydrate (Caustic Soda) by Alcohol (in sticks)	℔.	.45
Sodium Hyposulphite ("Hypo")	℔.	.04
Sodium, Metallic	℔.	.90
Sodium Nitrate	℔.	.05
Sodium Phosphate	℔.	.09
Sodium Silicate (Water Glass)	℔.	.04
Soot, Calcined	℔.	.15
Spelter, see Zinc.		
Spermacetti	℔.	.40
Sugar of Lead, see Lead Acetate.		
Sulphur (Brimstone), in lump	℔.	.05
Tin Chloride	℔.	.43
Tin, Metallic	℔.	[illegible]
Turpentine, Venice	℔.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water Glass, see Sodium Silicate		
Wax, Beeswax, yellow	℔.	45
Wax, Carnauba	℔.	.70
Wax, Japan	℔.	.20
Whiting (Ground Chalk)	℔.	.02
Zinc Carbonate, dry	℔.	.19
Zinc Chloride	℔.	.12
Zinc Sulphate	℔.	.06
Zinc (Spelter)	℔.	.05¼

THE BRASS WORLD AND PLATERS' GUIDE

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Saving Oxide of Zinc in Brass Making.

In this age of economy, when so many waste products are utilized and thus made to show a profit, it seems opportune at least to attempt to theorize on the probable future of the brass industry in connection with the reclaiming of the oxide of zinc which is lost every time brass is melted. The subject has always been of much interest, but within the last year considerable thought seems to have been given it, and a number of inventions have made their appearance. So far, nothing appears to have been done in the brass industry to install any apparatus for saving the oxide of zinc, although rumors are heard that one or two of the large brass mills are investigating the subject. While it is not a difficult matter to save the oxide of zinc produced in brass melting, the schemes heretofore tried or suggested have usually resulted in such an interference with the draught of the furnace, and the performance of the duties of the caster, that it has always been considered it did not pay. To be of service, a method for saving the oxide of zinc must not interfere at all with the operations of a mill or foundry.

The magnitude of the loss of spelter in brass making is not generally appreciated. Let the brass rolling mill trade be taken as an example. There are probably not far from 300 brass casters employed in all the brass rolling mills, tube mills and allied industries. These mills are known under the general head of "brass rolling mills". It is now customary for each caster to run [illegible] and usually about [illegible] pounds [illegible]. [illegible]

No. 60 crucible is used, although some 70's and some 50's are likewise employed. The average quantity melted in a crucible may safely be taken at 150 lbs.

With the preceeding data, it is easily calculated that the average daily amount of brass cast in the brass rolling mills of the United States is about 2,250,000 lbs. Let it be taken at 2,000,000 as a round number. In the manufacture of brass for roiling. the average waste is about one per cent. In some mills it runs more than this amount, but this figure may be taken as a safe one. One per cent of 2,000,000, therefore, is 20,000 or 10 tons. In other words 10 tons of spelter are daily wasted by dissipation in the air in the brass rolling mill industry alone. If the price of zinc be taken roughly at five cents a pound, at least $1,000 are daily lost.

While the brass foundry trade is small individually speaking, yet there are so many scattered over the United States that they form a larger aggregate than the brass rolling mill trade. In addition to this feature, they waste many times as much zinc. It is probable that several thousand dollars daily are wasted in the brass foundry trades of the United States.

Special Alloys and Their Future.

It is to be regretted that the investigation of special alloys has not been carried to the extent in the non-ferrous metal industry that it has in the iron and steel trade. In the latter business, the early investigation have culminated in commercial success and it is probable that non-ferrous investigations would do likewise. It is now possible to obtain so many of the former so-called rare metals at a very reasonable price, and their effect on the common metals is so little known, that there are great possibilities in this direction. Early investigations in the steel industry demonstrated that nickel improved steel for certain purposes and then nickel steel became an article of commerce. Tugnsten also proved valuable and the numerous self-hardening steels are the result. Vanadium gave other properties of a peculiar nature and chromium was likewise discovered to be of service. It is quite probable that investigations of a similar character in the non-ferrous industry would also be rewarded with success.

There is one feature in the manufacture of special alloys that needs to be taken into consideration, and in it there is room for more investigation than in the making of the alloys themselves. It is in the actual casting of them. To make an alloy is one thing, but to be able to successfully make a sand casting, or a billet that will roll into rod is another. This feature of special alloy work has retarded the development in the past, and probably will in the future. When aluminum first made its appearance in the field, no one was found who could successfully cast it, and for many years the business remained dormant. Gradually, however, foundrymen became acquainted with its peculiarities until today, there are many founders who are turning out extremely creditable work.

Insufficient Rinsing as a Cause of Spotting Out.

After visiting a number of plating establishments where all kinds of plating are done on castings, both brass and iron, and in which more or less difficulty has been experienced in spotting-out of the work after plating, we are convinced that some of this trouble comes from not sufficiently rinsing the work after plating.

Take, for an example, a casting that has been brass or copper plated. When it is removed from the plating tank, and given a "swish" through the cold and then through hot water and immediately taken out of the solution, the imperfections of the casting do not have sufficient opportunity to escape. A quick rinse is all right with sheet metal work, perhaps, where there are no blow-holes or other imperfections; but in the case of castings, which are always more or less porous, it will not properly remove the solution.

Castings, particularly, should be not only rinsed in the rinse water, but soaked. Hot water is far more efficacious in removing the plating solutions from the pores of the casting than that which is cold, and should be used whenever possible. The method which should be followed is to rinse the work in a cold water tank after it comes from the plating solution, in order to remove the amount that adheres to the surface and prevent contaminating the hot water. Two hot water tanks should be provided. In one the work should be soaked for an hour or two. The other is kept as clean as possible and the soaked work is finally rinsed in this and dried. If this method is followed, some of the cases of spotting-out will disappear.

The Art of Casting Manganese-Bronze, and the Manner in Which the Difficulties are Overcome.

The rapidly increasing use of manganese-bronze sand castings and the satisfaction that is attending such employment demonstrate that a better understanding of the methods of casting is needed by the general brass foundry trade. Every foundryman undoubtedly believes he can make manganese-bronze castings, and so he can after a fashion. As a usual rule, they are nothing more than castings. As far as meeting the requirements of the trade, it cannot be said that they are satisfactory. The only brass foundries that turn out a good manganese-bronze casting are those which have made a special study of its peculiarities, and are constantly on the alert to overcome them.

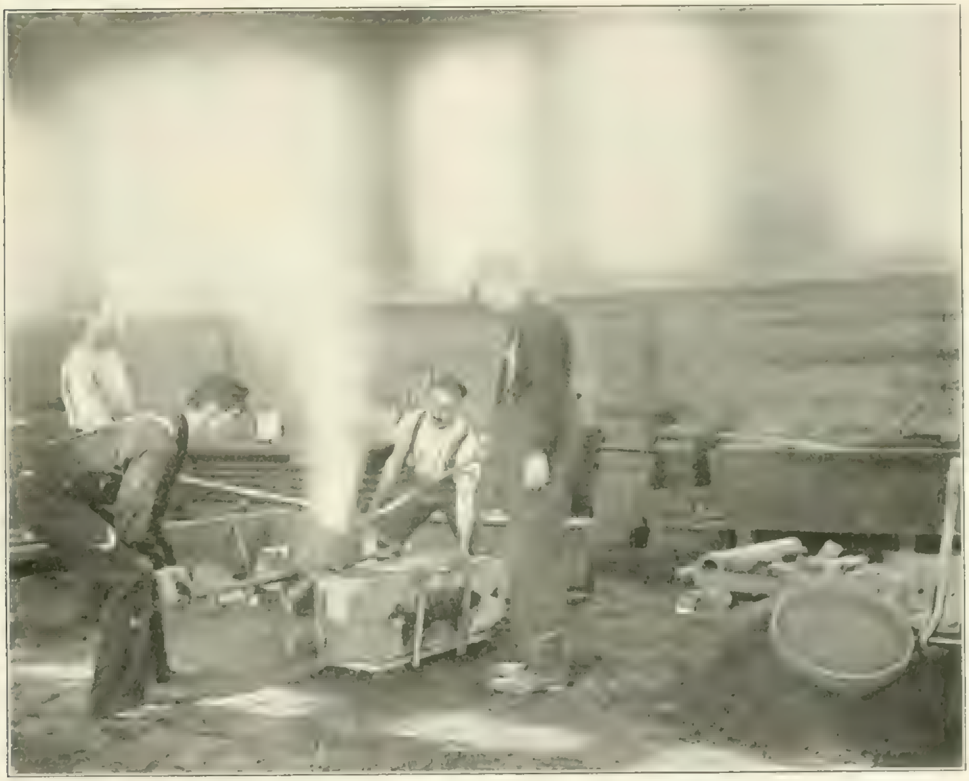


Fig. 1. Pouring a Casting of Manganese Bronze. The Temperature of the Melted Metal was too High as Indicated by the Oxide of Zinc Smoke. Casting had Yellow Crystals in Center

Manganese-bronze is, unquestionably, the most difficult metal with which the brass founder has to contend. If he makes his own mixture, it is usually brittle or too soft. If he purchases the ingot metal he ruins it by careless treatment in melting and casting. And let it be said at this point, that the average brass foundry, which only occasionally uses manganese-bronze, is better off to purchase the ingot from a reliable maker than to attempt to make it, as it contains at least six different ingredients, and is very sensitive to an increase or decrease of any one of them. In addition to this feature, few brass founders have scales sufficiently accurate or sensitive for making up the mixture, nor do they understand the necessary detail of the operation. Not only is manganese-bronze one of the most difficult mixtures to cast, but also to make.

Melting.

The best results are always obtained by using crucibles in melting manganese-bronze. Other forms of furnaces in which the flame impinges directly upon the metal result in too great a loss of spelter and the casting is then of uncertain composition and low in tensile strength. To be sure, very large castings have to be made in air furnaces (reverberatory furnaces) or their equivalent, but it has now become well established that the castings thus produced are much inferior to those produced from crucibles. The variable loss in spelter, and the absorption of gases from the fire, as well as the accompanying oxidation, cause this trouble. Reverberatory furnaces have proved so unsatisfactory for melting manganese-bronze that many manganese-bronze founders have abandoned them altogether and have gone back to the exclusive use of crucibles. When a large casting is to be made, the ingot metal is melted in crucibles and then poured into a ladle. In this manner some large castings are made and with satisfactory results.

If the founder makes his own manganese-bronze ingot, let it be known that the best results are always obtained by melting the ingot metal twice. When first made, the manganese-bronze does not give as good results as it does after another melting, and for this reason, when first made, the metal is poured into ingots which are then remelted and poured into the casting.

The manganese-bronze ingots are placed in the crucible so that they will not project above the top. It is bad practice to have ingots protruding from the top of the crucible where they are struck directly by the flame. The outside melts and runs down exposing fresh metal to the action of the flame. A large surface is thus exposed to the oxidizing action of the air and every opportunity given for absorbing gases. Such melting is really no better than that done without crucibles. *The best condition for melting is when the metal does not project above the top of the crucible but is a few inches below so as to allow for a charcoal covering.*

The crucible that is used for melting manganese-bronze should not be too small. When a small one is used, it is impossible to place the ingots in it as they should be placed. It is well to put a small quantity of charcoal in the bottom of the crucible, and then place the ingots on it. It serves to protect the metal as it melts and runs down to the bottom. Scrap and gates are broken up into as small pieces as possible so as to pack well in the crucible.

When the crucible is charged, the top is well covered with a layer of charcoal to protect the metal from oxidation and gas absorption. No other flux should be used. Neither is it necessary, nor is it advantageous. A simple covering of charcoal is all that is required, but should not be omitted.

The heat in melting manganese-bronze must not be fierce. It is a low melting metal and a moderate fire melts it without difficulty. Too fierce a heat is quite objectionable as it overheats a portion of the metal before the rest is much beyond a black heat. The best fire for melting is that which heats all portions of the metal uniformly, so that the actual passing from the solid to the liquid condition takes place at about the same time with all the metal. When this is the case, the overheating of one portion of the metal before the other begins to melt is avoided. A moderate, uniform fire always gives the best results. It matters not whether the fuel is coal, coke or oil as long as these conditions are met; and it is possible, with a proper furnace, to obtain them. A very slow fire, on the other hand, is equally as bad as too fierce a one. The metal melts and lies exposed to the air and products of combustion for a long time.

When the manganese-bronze begins to melt, more charcoal should be added if the surface is not already covered completely. The object is to prevent the air and products of combustion from coming in contact with the metal. The molten manganese-bronze must now be carefully watched, and if it becomes so hot that oxide of zinc fumes are given off freely, some gates are added to cool it down, but it is always advisable to have the molds ready for pouring before the metal is melted. To allow it to soak in the fire not only means a loss of spelter but also a gas absorption and both of these features serve to produce a casting lacking in strength. To obtain high tensile strength in manganese-bronze, it is the best policy to have the molds ready for pouring even before the metal is put into the fire. When the right "heat" has arrived, the metal can at once be poured without any need for cooling down.

The Pouring Temperature.

The pouring temperature of manganese-bronze is one of the important points in its successful casting. If poured too hot, the casting will be full of dross and cracks and will be lacking in strength and other physical properties. Too cold a temperature results in castings that will not run or in which the particles of metal are not completely united. Metal poured while pasty always has this defect.

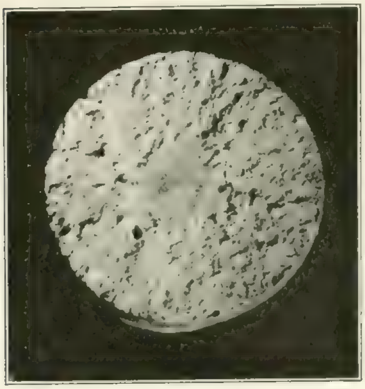


Fig. 2. Fracture of Manganese-Bronze Sand Casting, Showing Yellow Crystals in Center Caused by Pouring too Hot.

The exact pouring temperature of manganese-bronze cannot be laid down, as it depends upon whether heavy or thin castings are to be made. The majority of castings made in manganese-bronze, however, are usually heavy, and for this reason *it may be said that the pouring temperature of manganese-bronze is reached when the surface of the metal scarcely smokes at all unless disturbed.* When the metal is gently touched with a skimmer, however, oxide of zinc fumes are gently but not copiously given off. It may be said that this pouring temperature is practically the lowest it is possible to use, and answers for heavy work. For thinner castings, the metal will have to smoke very gently from the undisturbed surface, and when slightly stirred with a skimmer, oxide of zinc fumes are copiously given off.

Manganese-bronze castings poured at too high a temperature never have the tensile strength or other physical properties that are possessed by those poured at the lowest possible temperature. The colder the manganese-bronze can be poured, and still avoid the pasty condition, the stronger and more homogeneous the castings. In Fig. 1 is shown the pouring of a manganese-bronze casting. It was large enough to allow the metal to be poured at quite a low heat, but it will be noticed that the oxide of zinc fumes are coming out of the crucible freely. This indicates too high a temperature. The metal could have been cooled down considerably without difficulty. The result of pouring at this "heat" is the presence of dross in the casting and the formation of yellow crystals in the center.

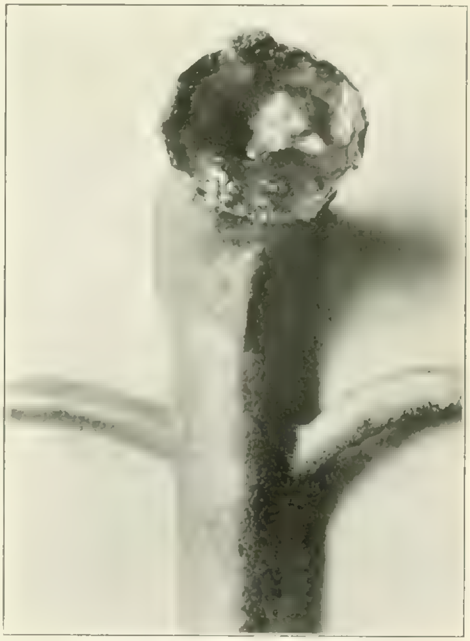


Fig. 3. Gate Showing Right Pouring Temperature.

The formation of yellow crystals in the center of the casting has been noticed by all makers of manganese-bronze castings. It is always the result of pouring too hot. In Fig. 2 is shown the fracture of a casting which has this difficulty. The reason is simple. The slow cooling which takes place under these conditions results in the formation of crystals in the center of the metal. It is a well known physical fact that the slower [illegible] from the molten condition, the larger the crystals. When the manganese-bronze is poured at as low a heat as it will run, the metal solidifies at once and more uniformly throughout. There is then less opportunity for the crystals to form. When there are yellow crystals in the center of a casting, it indicates that the casting was poured too hot.

The effect of hot pouring is also noticeable on the gate. In a manganese-bronze casting poured at the right heat, the top of the gate will be somewhat smooth, like that shown in Fig. 3, with a slight shrinkage. On the other hand, a casting that is poured too hot will show a rough surface, like that of Fig. 4, and very little shrinkage. While the casting poured "hot," shrinks more than one poured "cold," the large amount of dross formed imparts an appearance to it of not shrinking much.

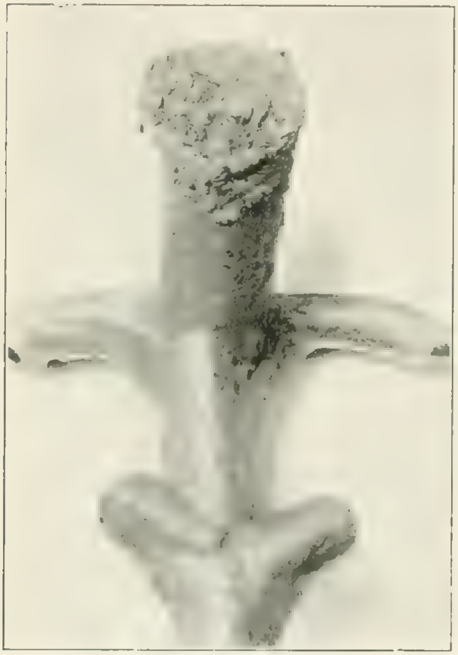


Fig. 4. Gate Showing too High a Temperature in Pouring.

The Pattern.

To obtain the best results, a pattern should be made particularly for casting manganese-bronze. Patterns made for gray-iron or brass may or may not answer as it will depend upon whether it is a difficult one. Frequently a pattern made for casting these metals cannot be used at all, and an entirely new one must be made for manganese-bronze. Sometimes a little alteration is all that is needed. Sharp corners should always be avoided. Even a small fillet is not advisable, and the corner is best rounded out to a considerable degree. Cracks usually form in a sharp corner, and when rounded are less apt to be found.

One can hardly dictate to a machinery designer or ship builder how he shall make his work. It is considered the function of the brass founder to make what he designs. This has always been the way in making other kinds of castings, and if one founder would not take them another would. In the case of manganese-bronze, however, it would be far better for the designer to ascertain if the designs could not be made to conform as much as possible to it. There are many instances where a very slight alteration or change will greatly facilitate the making of the castings, and insure better work. A designer cannot always make his work as the founder would like to have him, but he can consult with him and when it is done far better work invariably results.

Gating.

The gating of a manganese-bronze casting is a very important matter, and many are found imperfect on account of a lack of knowledge on this point. The old rule of gating on the heavy part, that is a time honored custom of making brass and iron castings, is not to be taken seriously in making manganese-bronze castings. Instead, a new rule should be followed. Gate on a light part, and put a riser on the heavy parts.

The gate should be as long as possible to clear the metal from dross which may enter the casting. It is a well established fact in brass founding that a long gate collects dross and prevents it from entering the casting. If one does not believe it, let two gates be tried: A short one and a long one, and the evidence will be completely in favor of the long one. There is no stated length, but usually it is customary to run it the full length of the flask, or in other words, to attach the gate at one end of the flask and run along to the other end where a pouring hole is cut. For large castings a skim-gate is very efficacious, and is extensively used. Even when it is used, the long gate should be used as well.

Risers.

Risers are the "salvation" of manganese-bronze. To make a large casting without them, and still have it sound would be almost a miracle. They are used to take up the shrinkage. Brass founders are often found who boast that they can make a manganese-bronze casting without the use of risers, but while their castings may look well, a large shrink-hole will be found in the middle of them. Risers are the only known method of compensating for the shrinkage.

Many of the beliefs that exist about risers are wrong. Iron founders usually know little about them, and brass founders (who have always cast brass) know less. They consider that a large vent will answer, and the average iron founder will put a riser about as large as a broomstick on a thousand pound casting and know that it will hold it up. A riser of this character is worse than useless on a manganese-bronze casting as it actually injures it by drawing from it rather than feeding it. *To be of service a riser must be sufficiently large to remain liquid while the casting is cooling.* If the riser cools first, it draws from the casting rather than feeds it. The best method to follow is to put the riser or risers on the heaviest parts, as these are the last to cool. The riser must be of sufficient size to remain liquid while the casting is cooling, and feed it liquid metal to make up for the shrinkage. A rule cannot be laid down about the size of a riser. There is no danger of making it too large, but if too small the casting is not fed and it will have a shrink hole in it.

The Sand.

The best results in casting manganese-bronze are always obtained in dry sand, particularly in the case of large castings; but green sand is now so extensively used in foundries for making castings that dry sand molding seems to have almost passed out of existence. A dry sand mold, in spite of the belief to the contrary, should be well vented even though there is no moisture present. The sand contains more or less organic matter which produces gas, and the combined water in the clay contained or used in the sand is also expelled when the metal strikes it.

In the case of green sand, the sand should be worked as dry as possible. Wet sand, even though it may not "blow" causes a slight disturbance in the metal, and every time that manganese-bronze is disturbed, dross is formed. The mold should be rammed as lightly as it is possible to make it, and very carefully vented. The object is to avoid any "blow" or disturbance of the metal when it enters and fills the mold, even though very slight.

The use of any blacking or wash on the face of the mold is not advocated. On account of the presence of aluminum in the manganese-bronze, it does not adhere to the sand at all, but will come out as clean in sand that has not been blackened. The danger in the use of blackings is that they fill up the pores of the sand and prevent the escape of the steam when the metal strikes it.

The Pouring.

While pouring a casting is apparently a simple operation, there are one or two features about it that need attention. In the first place, there should be just as little drop when the metal is poured as possible. It is worthy of note that the more manganese-bronze is stirred up the greater the quantity of dross. For this reason a long drop when the metal is poured into the casting means the formation of dross and it is apt to enter the casting. The molder, in pouring should hold his ladle or crucible as low as possible, or rest it on the side of the mold, in order to have as little drop to the metal as possible.

The stream in pouring must not be interupted or there will be cold shots in the casting. The pouring should not be too fast. In fact, the best results are usually obtained by pouring the manganese-bronze quite slowly and in a rather small stream. By doing this, the dross is held in the gate. A large stream is apt to force the dross into the casting. To know the right kind of stream so as to produce the best results, requires considerable judgment on the part of the molder.

Use of Scrap.

If the scrap from manganese-bronze could be thrown away the results would be better as it introduces a factor of more or less uncertainty. Let it be understood that manganese-bronze chips, when castings of high tensile-strength are required, are rather unsafe to use, and the best method of disposing of them is to sell them for other purposes or use in unimportant work. They oxidize and waste so much in melting that the resulting product is of quite variable composition and reliance cannot be placed upon it. In the case of gates and risers, the problem is not as difficult and they are of sufficient size to allow melting in a satisfactory manner. Long gates should be broken or cut up so that they do not project above the top of the crucible and waste in melting.

In melting manganese-bronze, a certain quantity of spelter always volatilizes every time the metal is melted. Unless new spelter is introduced to compensate for it, the strength of the bronze is injured. In two or three melts enough spelter will be lost to render the bronze quite soft and unfit for many purposes. To lay down an absolute rule about the amount of spelter that is wasted when the metal is melted, is impossible, as no two conditions are the same. It may be said, however, that in careful melting, where great care is taken to avoid overheating the metal, from 1 to [illegible] lbs. of spelter should be added to every 100 lbs. of manganese-bronze to make up that lost by volatilization. If the melter is not over careful and allows the metal to smoke freely while melting, then from 1½ to 3 lbs. of spelter will have to be added to every 100 lbs. of the bronze. In melting in a reverberatory furnace it is usually considered that about 5 or 6 per cent of spelter is lost in good practice.

Plastic-Bronze Patent Sustained by a Re-issue Patent.

The Ajax Metal Co., of Philadelphia, Pa., manufacturers of plastic-bronze bearing metal, have been granted a re-issued patent upon the mixture employed in making this material, which now fully protects it. In connection with this re-issued patent, the following circular is now being sent out to the trade:

"Enclosed please find a copy of the recent re-issue of our original patent for copper-tin-lead bearings and bearing metal containing more than 20 per cent. of lead. The Circuit Court sustained our original patent on the ground that it covered the process of making such bearings by limiting the tin to 9 per cent. of the copper; thus permitting of an almost indefinite increase of the lead above 20 per cent. The Court of Appeals held that our original patent, by reason if its terms, covered only the product and not the process, and reversed the Circuit Court.

"In view of these decisions, and to the end that our exclusive rights in the real invention might be protected, the Patent Office granted us the re-issue patent which covers the process that was found patentable by the Circuit Court. The re-issued patent is for the same invention as the original patent, and differs from it only in claiming the real invention as defined by the Circuit Court. It is, therefore, infringed by the production of lead-copper-tin bearings, or bearing metal containing more than 20 per cent. of lead and less than 7 per cent. of tin, and the balance copper by limiting the tin to less than substantially 9 per cent. of the copper in the mix.

"You are notified that infringers will be prosecuted, and the foregoing explanation is made so that you may not be led to infringe by a misapprehension of the present status of our patent situation."

A Cheap White Metal for Sand Casting.

A white metal of a color approaching silver, and with greater strength than brass, may be made of the following mixture:

Copper . . .	50.00%	or 50 lbs.
Zinc	34.00%	or 35 lbs.
Nickel	15.00%	or 15 lbs.
Aluminum	0.10%	or 2 oz.

As it is difficult, with the scales usually found in a brass foundry, to weigh accurately as small a quantity as 2 oz.; and as the mixture is very sensitive to larger quantities, the following method is recommended for making up the mixture:

Take the following:

Zinc	10 lbs.
Aluminum	1 lb.

Melt together and pour out into small bars. It may be readily broken up. This is called the "Rich Alloy."

For the white metal mixture, the following is therefore taken:

Copper . .	50 lbs.
Zinc .	33 lbs.
Nickel	15 lbs.
"Rich Alloy" . .	2 lbs.

The copper and nickel are melted together, and then the "Rich Alloy" added. After this has been done, the spelter is introduced. The best results in castings are always obtained by melting this mixture twice, but about 1 [illegible] lbs. of zinc must be added every time it is melted (after the first time) to compensate for the loss.

Automatic Electroplating by Means of the Broderick Machine.

One of the most interesting automatic appliances that has made its appearance in the electroplating trade is the Broderick machine. It is unique for the reason that, not only has the inventor departed from the customary barrel methods, but has also incorporated the preliminary cleaning and final rinsing and drying out of the plated work in it. The machine takes the work to be plated before it has even been cleaned from grease, electroplates it with any desired deposit, rinses it and then delivers it in a dry condition. If desired even the final lacquering operation may be done as the final operation; but as plated work usually requires buffing or other finishing, the lacquering is usually dispensed with. Many kinds of work, however, may be completely treated, from the uncleaned article up to the delivery in the lacquered and finished condition.

The machine as used for the electroplating of hardware is herewith illustrated. Fig. 1 is the side view of it, while in Fig. 3 the end view is shown. In Fig. 2 a sketch is given to illustrate the principle of the machine.

An endless chain carrier is made to travel, by means of sprocket wheels at each end of the machine, over each cleaning and plating tank. This chain carrier is designated in Fig. 2 by 4. The tanks are arranged in the shape of an oval, making the chain travel continuous and the feeding and delivery take place at the same point.

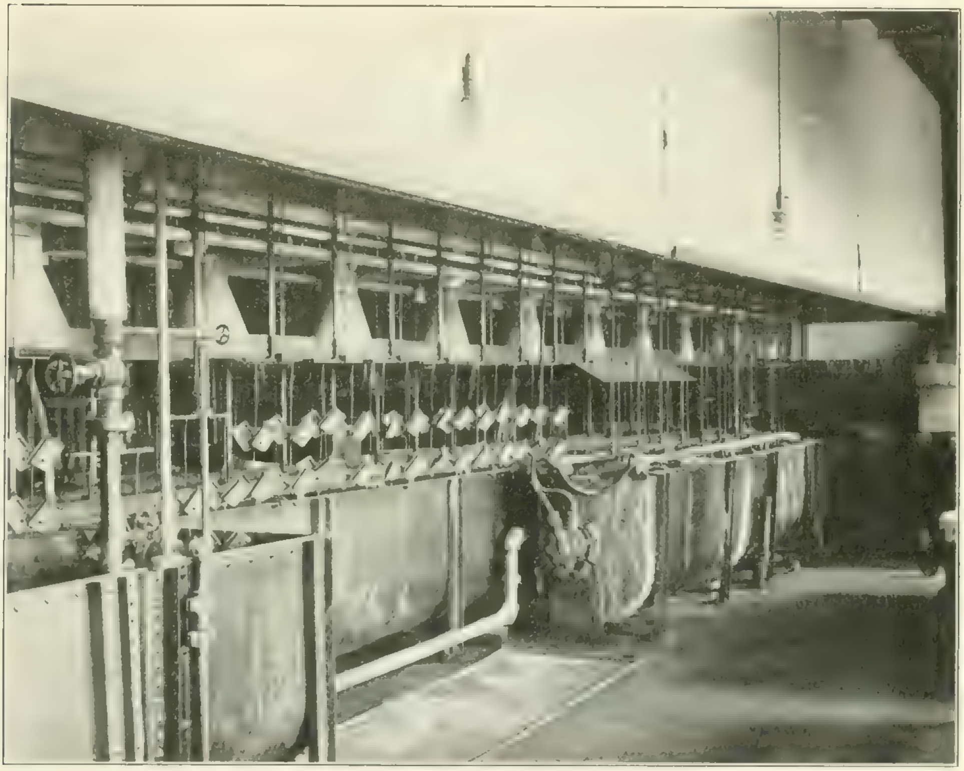


Fig. 1. Side View of the Broderick Plating Machine Installed at the Works of the Yale & Towne Mfg. Co., Stamford, Conn. Shows Charging and Delivery Point.

Attached to the chain carrier are arms

which travel with it. At the bottom, the arms are made in the shape of a T, so that racks or wired work may be readily hung on. In addition to the horizontal travel of the arms, they also have a vertical movement. This is produced by suitable mechanism so that as they move forward, a contact is made with the inclined track 23, which causes the arms to drop down in to the tank underneath. The object of this mechanism is to allow the automatic lowering and raising of the arms, containing the work to be plated, from one tank into another. In this manner the work is first lowered into one tank, travels along until it comes to the end, and is then automatically lifted out of the solution and carried over to the next tank, where it is again lowered.

the solution. In it is the cleaning material. Any desired cleaning material may be used, but at the works of the Yale & Towne Mfg. Co., in which the machine herewith illustrated is operated, an electric cleaner is used.

The arms are of bronze-rods and are connected with the current so that they form the cathode. As the work passes to the electric cleaner, therefore, the current immediately begins to pass and the gas formed removes the grease and other foreign matter from the surface. From the electric cleaner the work passes to the first rinse tank at the end of the machine from which most of the cleaning compound is removed, but as a safeguard and to insure complete rinsing, a second rinse tank is provided before the work passes to the plating tank. From the second

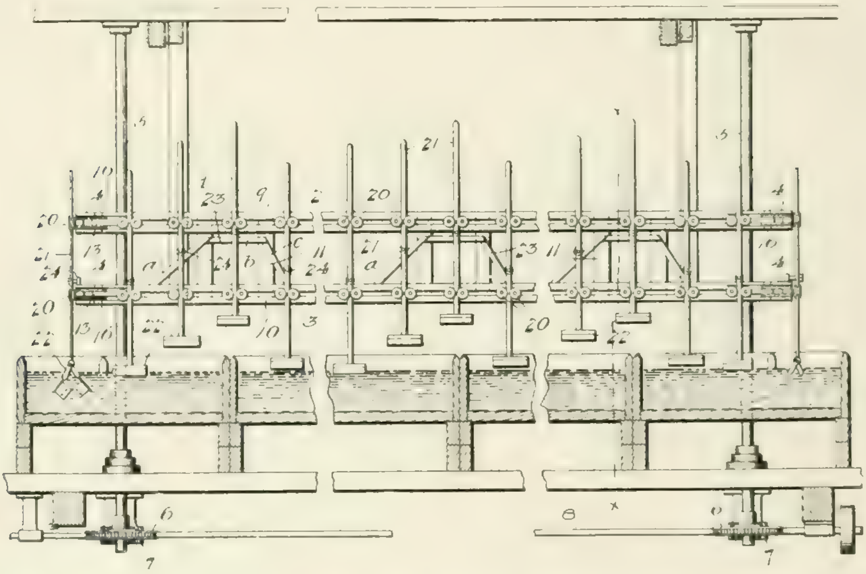


Fig. 2. Sketch Showing the Mechanism in Detail of the Broderick Plating Machine.

The working of the machine can further be explained by reference to Figs. 1 and 3. In Figs. 1 the charging and delivery end of the machine is shown between the two tanks. The work, which in this case is a portion of a lock, is hung from the T shaped portions of the arm as may be noticed from the photograph. The first tank is that [illegible] with the rheostat on the side. As the arms travel along they reach this first tank and then automatically drop down into

rinse tank the work passes to the regular plating solution. This is situated on the opposite side of the delivery end (see Fig. 1) and runs nearly the full length of the machine. The object of this long tank is to allow the travel to consume some material time to allow a given deposit to be put on. The speed of the machine may be regulated so that the work to be plated consumes from 3 to 45 minutes in passing through the plating solution. It will readily be appreciated, therefore, that a 3 minute deposit can be put on the work, or if desired, one of 45 minutes may be obtained. The deposit, therefore, can be adjusted to suit any condition and with absolute uniformity.

After the work leaves the plating tank, it automatically drops into the cold water rinse tank from which the greater part of the plating solution is removed, and from there it enters the hot water tank in which the last traces of plating solution are washed off and when the arm rises at the end of the hot water tank, the work dries off rapidly and is at once removed by an attendant.

continuously performed. There is no guess work, and the deposit on one piece is exactly the same as on the others.

The tanks are of 1/4 in. boiler iron as this material has been found preferable to wood for this purpose. There is then no leakage and the installation is permanent. Over the tanks a system of hoods are provided, and are connected with an exhaust fan to remove the steam and fumes which arise from the cleaning and plating solutions The room, therefore, is maintained in a well ventilated condition.

While the character of the work alters the capacity of the machine, small parts may be plated on the machine at the rate of 100,000 per day. Larger work has a less output. The capacity, of course, varies with the length of time of the deposit as a half hour deposit requires much slower speed than a two minute plate. The output is then correspondingly lessened.

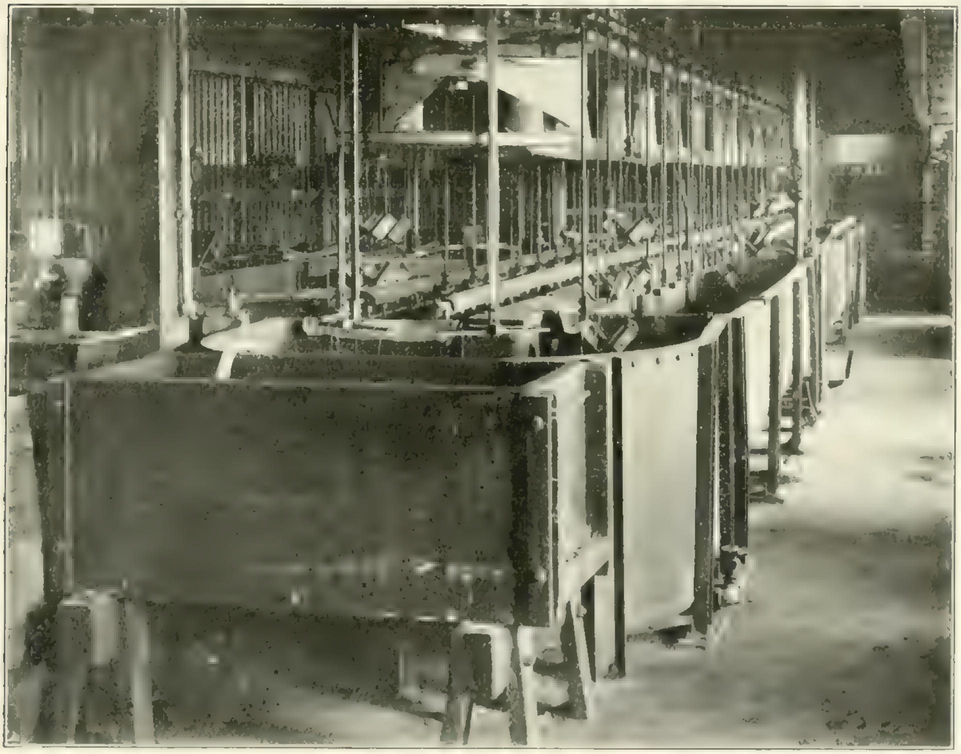


Fig. 3. End View of the Broderick Plating Machine. Shows End Used for Rinsing After the Work Has Been Plated.

The advantage of the machine is in the automatic manner in which the work is treated. The only labor required is to charge and unload the arms, and this may be done by unskilled labor. The cleaning, rinsing, plating and final rinsing (and lacquering if desired) are all automatically and

Although the previous description gives

only a certain method for treating the work, it is evident that many modifications can be used whenever desired. An oxidizing tank may be included as an auxiliary, or in fact many other changes may be made to suit special conditions. Each manufacturer has his own class of work, and in the use of the machine, it is readily modified to suit the case.

The photographs of the machine herein illustrated were supplied through the courtesy of the Yale & Towne Mfg. Co. of Stamford, Conn., the well known manufacturers of locks and builders' hardware. The machine is installed in their works and is operated daily upon a large variety of work. Both brass and copper solutions are used in it at their works and excellent examples of plating are produced by it. As the goods manufactured by this company are of the highest possible grade, the use of the machine in their works is a sufficient indication that it is capable of producing high grade work.

The machine is the invention of David F. Broderick, who designed the machine herewith illustrated to suit the needs of the Yale & Towne Mfg. Co. It was made to conform to the special requirements of their work, and it may safely be said that it is the largest automatic plating machine in existence. The machines are built under the supervision of the inventor, by Thornton N. Motley & Co., 50 Church St., New York City who are his representatives.

Correspondence.

Brass Plating Steel Brackets.

Editor:

I have noticed Question No. 585 in The Brass World, January 1909 in regard to brass plating steel brackets and obtaining a good, bright color. Your correspondent should have the brackets bright rolled at first and in separate pieces. Then plate them in a bright brass solution and assemble them after the plating has been done upon them.

This can be done and I plate about 50,000 pairs of them a year in this way and I do them all in a plating barrel, too, without any difficulty.

Henry G. Binder.

Plating "Over-Pickled" Cast-Iron.

Over pickled cast iron is the cause of much trouble in the electroplating trade. Many platers have difficulty in plating it, but assume that the plating solution is the cause. They are not aware of the fact that the actual trouble is not with the solution but with the iron.

Cast iron is always cast in sand, and more or less of this material always adheres to the surface. To remove it pickling is used. Usually the makers of the cast-iron pickle the castings before they send them to the customer, and the plater, of course, has to pickle them again. The maker of the castings is the one generally to blame as he uses very little care in the pickling operation, and the cheapest possible labor is put upon it.

When cast-iron is pickled, the iron is dissolved from the surface and a certain quantity of graphite, combined carbon, and silicon are left undissolved. The longer the pickling, the greater the quantity of these substances that is left. When a short pickling has been given the iron, the graphite, carbon and silicon may be easily wiped off from the surface, but when the iron has been pickled for a long time, it is impossible to do so.

When an attempt is made to electroplate such over-pickled cast-iron on which there is a skin of graphite, carbon and silicon, the deposit forms very slowly. The cause is the poor conductivity of these substances which prevents the deposition. An easy experiment for demonstrating that this is actually so is to over-pickle a piece of iron and then give one a light pickle. Both are placed in the plating tank at the same time. The deposit will form on the over-pickled piece very slowly and possibly almost refuse to form. The other piece plates rapidly.

As the plater cannot always prevent over-pickled cast iron from reaching him, although he should attempt to prevent it, whenever possible, it should first be plated in a good hot cyanide copper solution carrying plenty of copper in it, and which should stand about 20 degrees Beaume. If the cast iron will not take a deposit of copper in this solution, it will be impossible to do anything with it. After a copper deposit has been put on, and a light one only is needed if other metals are to be deposited on it, the other deposit can be put on without any trouble.

The Cause of a Rough Surface on Sterling Silver after it comes from the "Firing" Dip.

The method now followed in the United States for the manufacture of sterling-silver flat ware is as follows: A strip of sterling-silver of the desired thickness, and with a width slightly greater than the length of the spoon or fork, is blanked out by means of a press so that the greatest economy is practiced in avoiding scrap. The ends of the sheet are the only scrap. After this has been done, the blank is "graded." By this is meant the production of an uneven thickness on it. It is done by passing the blank through elliptical rolls so that the middle of the handle is left thicker than the bowl portion or extreme end of the handle.

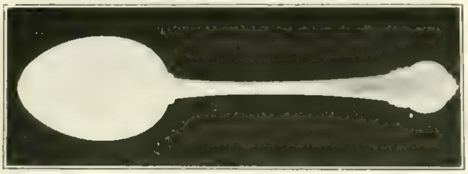


Fig. 1. Blank after Grading.

After grading, the spoon is again blanked so that it has the shape shown in the illustrations. When this has been done, however, the metal, on account of the working it has received in grading, is so hard that the bowl cannot be formed or the design on the handle struck up. In order to allow these operations to be done, the blank must be annealed.

The annealing operation is usually conducted in one of two ways. If the establishment is a small one, the spoon blanks are placed on an iron pan, upon which a piece of asbestos has been placed, and the whole heated to a red heat by means of a gas blowpipe flame. The flame is applied directly to the blanks. The other method is that of annealing the blanks on an iron pan in a regular annealing muffle, such as that employed in annealing German-silver blanks or sheet brass.

In either case, the effect of the annealing is the same. The blanks are softened, and the outside is oxidized to a black surface. The black material is principally oxide of copper, although it carries some silver with it. Now comes one of the peculiarities of sterling-silver or the formation of the so-called "fire" during the annealing. This "fire" is really oxide of copper which is produced during the annealing and which penetrates the silver to a greater or less depth. It is not the black oxide of copper, as this is present on the surface, but the sub-oxide (red-oxide). Only sterling silver shows it. No fire is found in fine silver.

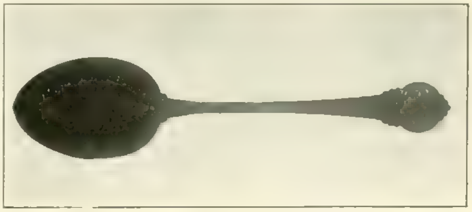


Fig. 2. After Annealing. Showing Black Oxide.

Up to this point, the manufacture of sterling silver flat ware is like that of German silver, but now a different treatment must be carried out. The "fire" which is formed during the annealing must be removed or a good "color" cannot be obtained on the finished work. When the blanks are annealed on an open pan by a blowpipe, more "fire" is produced than when a muffle is employed. The action of the air is the cause of the "fire," and if the sterling silver is annealed in a neutral or reducing atmosphere, no fire at all is produced. Such annealing has been carried on by a number of establishments with much saving, but the majority of manufacturers use the old method of annealing in an open pan by means of a gas blowpipe.

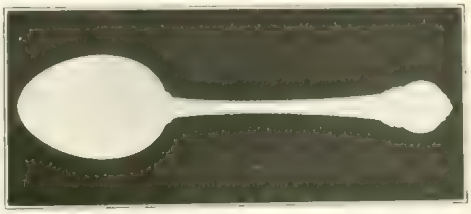


Fig. 3. Normal Condition After Pickling.

The method followed by sterling-silver manufacturers for removing the "fire" from sterling-silver is to dip the blanks, after they have been annealed, into a dip called the "firing-dip." This firing dip consists of equal parts of water and aqua-fortis (nitric acid) to which a small quantity of acetic acid, say a half pint to 2 gallons, is added to make it work "smooth."

Before this "firing dip" can be used, the black oxide that is present on the surface of the blanks must be removed by pickling. *Unless this is done, the dip will not work evenly and a rough, pitted surface will be found after dipping.* If the black oxide is pickled off before dipping, then a smooth surface results. The pickle used for this purpose consists of 9 gallons of water and 1 gallon of oil of vitriol. The pickle is contained in a lead lined tank (small ones can be used in a stone crock) and is heated by a steam coil of lead pipe. The blanks are allowed to remain in the pickle until all of the black oxide disappears. This usually takes but a few minutes, but if the pickle is weak or cold, then a much longer time is required. A hot pickle (the hotter the better) works rapidly and satisfactorily.

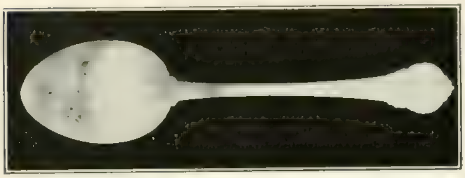


Fig. 4. Showing Effect of Dipping without Pickling.

When the blank has been pickled, it has a uniformly dead-white surface, free from oxide. After rinsing, the blanks are ready for the firing dip. *The firing dip is used hot.* It works too slowly when cold. The blanks are dipped into it until the surface becomes covered with a brown stain of peroxide of silver. The length of time for leaving the blanks in the firing dip varies with the depth of the "fire," but usually ten or fifteen seconds are all that are necessary. The longer the blanks are left in, the more silver will be removed. The appearance of the surface is a good indication as to the legth of time. When it is brown, it indicates that they have been allowed to remain in sufficiently long. It frequently happens, however, when the "fire" penetrates to an unusual depth, that a longer time is required. It is customary, when this happens to "fire" in the usual manner in the dip, then take one of the blanks and buff the surface to ascertain whether all of the "fire" has been removed. If not, then another dip is given.

When the blanks come out of the "firing-dip" they are coated with a brown film of peroxide of silver. They are now rinsed in water and then scratch-brushed with a soft brass brush to remove the brown film. This film does not adhere and is easily removed. When this has been done, the silver should present a uniform, white and half polished surface, free from roughness or gray spots. When this operation is over the blanks are ready for the final bowling and completion. This latter operation, however, does not concern the present article.

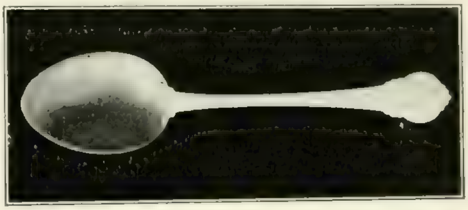


Fig. 5. Spot of Black Oxide on Side Caused by Insufficient Pickling.

Cause of a Rough Surface.

In many establishments, blanks occasionally come out of the firing dip with a rough, gray surface. Sometimes they will have a large number of them, and the surface is in such a condition that it is impossible to do anything with them. At other times, only a few will be found. The tendency is, of course, to believe that the silver is at fault, but this is not the case. *The difficulty is caused wholly by insufficient pickling, or not pickling at all.*

When the blanks are annealed, the surface is covered with black oxide. If they are now immersed in the "firing dip," without any pickling whatever, roughness will follow. It is well known that nitric acid attacks the silver far more rapidly than the oxide, and when the blanks, covered with the black oxide, are immersed in the "firing dip," the thinnest part of the oxide is removed first, thus exposing the metal. The action on the bare metal then follows with great rapidity while the thick portion of the oxide is not uniformly removed. Although the black color is eliminated, a gray stain is left. Those who have seen such blanks, know that the surface has a gray, rough appearance.

On the other hand, if the blanks, after they have been annealed and are covered with a black oxide on the surface, are pickled in dilute sulphuric acid, as previously mentioned, the oxide will be attacked more rapidly than the metal itself. The result is the removal of the oxide from the surface without injuring the surface at all. Only a small amount of silver is dissolved. The blanks, then, are left in an ideal condition for the "firing dip" and it will act evenly over the whole surface.

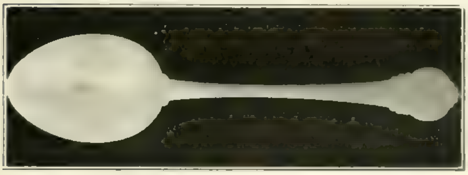


Fig. 6. Rough Surface Caused by Dipping Spoon Blank Shown in Fig. 5, without Pickling.

The illustrations herewith reproduced from actual photographs will serve to show the process previously described. In Fig. 1 is shown the spoon blank after it has been graded and blanked ready for annealing. In Fig. 2 the blank after annealing is illustrated showing the surface covered with black oxide. Fig. 3 shows it after it has been pickled and is ready for the "firing dip." The surface is clean and uniform and is in an ideal condition for dipping.

In Fig. 4 is shown a blank with the rough surface on the bowl portion, caused by dipping in the "firing dip" without previously pickling. In order to illustrate the point to the best possible advantage, the handle was pickled previous to going to the fire dip, but the bowl was not. It will be noticed that the handle shows no roughness.

Even though a flat-ware maker may pickle his blanks after annealing and previous to fire-dipping, an imperfect pickling may frequently result, and this acts in the same manner as the total absence of the operation. In pickling it often happens that one blank will lie closely to another so that the acid will not act on the oxide. Such a blank is that shown in Fig. 5. When it is run through the firing dip, therefore, the effect on the portion not acted upon by the pickle is the same as it would be were the whole surface not pickled. In Fig. 6 the result of the firing dip is shown. The spot which was not pickled became rough and gray.

To obtain a uniform and clean surface in the "firing dip," therefore, it is not only necessary to pickle the annealed blanks previous to dipping, but to ascertain that they have been *completely* pickled. Nitric acid, it should be borne in mind, attacks metal more rapidly than oxide, while sulphuric acid does not.

Silundum, a new Electric Furnace Product.

According to F. Bölling in *Chem. Zeit,* 1908, 32 pages 1104 1105, silundum a new product of the electric furnace is obtained by heating carbon with carborundum, to which sand may also be added. This product is intermediate between carbon and carborundum. The temperature used for heating is from 1700 to 1800 degrees C. Carbon articles, by this treatment, can be converted into silundum on one or both sides as may be desired.

The electrical conductivity of silundum is considerably less than that of carbon. It is stable in the air up to high temperatures. Molten metals, such as iron, rapidly destroy it, and consequently articles like crucibles should be converted into silundum only on the outside

Silundum cannot be used for making incandescent lamp filaments on account of the deposition of brown silicon on the surface of the glass. The author states that the chief use of this new material appears to be as a permanent resistance material for high temperature work.

A large proportion of the solder sold contains a small percentage of antimony. It is the result of smelting drosses and the removal of all of the antimony, which is present in such drosses, is difficult. In order to obtain a solder free from antimony it is usually necessary to use new pig tin and pig lead.

A Bright Brass Solution.

By Walter T. Donnelly.

Thinking that it might be of interest and service to the readers of The Brass World to know how to make and run this most difficult of plating solutions, the writer will attempt to crowd his experience in as few words and as intelligently as circumstances will permit. I will first give the formula and afterwards details as to making. This solution plates on soft metals and cast-iron equally well, and the longer articles are left in it the deeper golden yellow and the brighter the deposit becomes. It is made as follows:

Water	1 gallon
Potassium Cyanide..........	5 oz.
Copper Carbonate	3 oz.
Zinc Carbonate	½ oz.
Ammonia	½ oz.

The water must be pure and if necessary it should be boiled. The cyanide must be of the best possible grade. The carbonates of copper and zinc should be freshly precipitated. They are precipitated from the sulphates of copper and zinc in the usual manner. Dissolve the cyanide in a portion of the water, and then add the carbonate while stirring. When dissolved, add water enough to make up the gallon. The ammonia is next added. Sheet brass anodes are used, and lots of them.

Now for the brightening stock solution. Take a bottle holding 1 gallon and put 2 oz. of bi-sulphide of carbon into it and dissolve it in 2 oz. of chloroform. Now add [illegible] oz. of white arsenic and fill the bottle with the brass solution. Shake it every little while for about twenty- four hours. This is the stock-brightening solution, and must be added as follows:

Every evening after the day's work, put 1 oz. of the brightener in a graduate and fill up with the brass solution. Now pour the whole into the regular brass solution, mix, and it will be ready for use in the morning. The writer uses this solution when plating metal novelties, metal picture frames, cast-iron clocks, etc., which are gilded or finished in any desired color, direct from the solution. Now about handling the solution. The amount given is for 100 gallons.

A very weak current must be used, say from 1 to 1½ volts, according to whether you are running white metal or cast-iron goods. If they are of cast-iron, a preliminary nickel deposit, say ten minutes, will prevent "spotting-out", and which is true of all finishes on cast-iron, either brass, bronze or copper. From time to time freshly precipitated carbonate of copper must be added to the solution.

An experienced plater will find this an easy and at *all* times a reliable solution to run, as his experience will enable him to supply all necessary details to fit his class of work. The novice, however, may experience some difficulties. This formula was devised by the writer and has been in use by him on all his work, and has never failed to give satisfaction.

As the water in the solution evaporates, the density becomes too high. It will then plate dull on the high lights of the work. The remedy is to take out about a third of the solution and fill up the tank with clean, pure water. Two or three times each week from 3 to 4 oz. of ammonia must be added to every 100 gallons of the brass solution. Do not pour it in direct, but take out a pitcher full, stir in the ammonia, and then "spread" in the brass solution so as to thoroughly mix it.

I wish to say that absolute cleanliness must be observed in the handling of the work intended for this solution, and at the same time it is opportune to lay stress upon the fact that more solutions and dips are rendered unfit for use by the careless handling of the work to be plated than all the impure chemicals that may enter into their make up. I have been in plating rooms and observed the help grab a handful of wires containing work to be plated and run it from one dip to another without properly rinsing after each dipping operation. Acid was carried into alkalies and vice versa. Even if each piece should carry only a fraction of a drop of one solution into another, at the end of the day, the week or the month, there results a solution which does not work well, or is out of commission entirely. The plater then blames the chemical supply house, or claims that some one has "doped" his solutions and dips, when only his careless, sloppy methods are the cause.

Nickel plating solutions work badly when cold, and this is the cause of much trouble in winter. All tanks should be provided with a steam coil of lead pipe for warming the solutions when necessary.

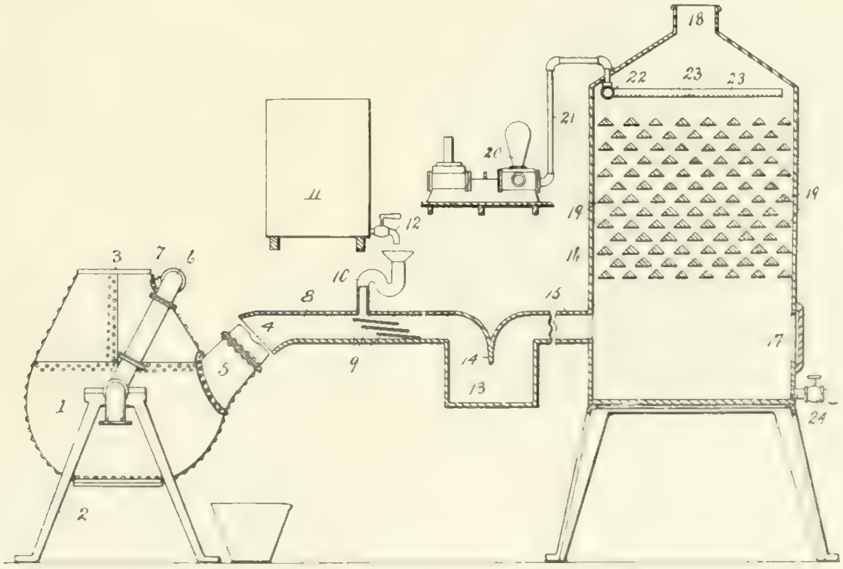
An Apparatus for Saving Oxide of Zinc Produced in Melting Brass.

In melting brass, oxide of zinc always escapes and is wasted. Thousands of dollars are annually wasted in this manner. While the matter has been given much thought, and many devices have been constructed for saving oxide of zinc, none have heretofore proved of value on account of the interference with the working of the furnaces.

An appliance for saving oxide of zinc produced during the melting of brass, has been invented and patented by William H. Allen of Detroit, Mich. (U. S. Patent 910,982, Jan. 26th, 1909.) The appliance has been fitted to a Schwartz furnace and the blast used in operating it acts beneficially in forcing the fumes through the pipe into the cooling chamber. The appliance is herewith shown.

A Schwartz furnace, used for melting the brass, is shown by 1. The gas from the opening 4 enters the iron pipe 8, and comes in contact with the baffle plates 9. Either hydrochloric or sulphuric acid is allowed to drop upon these baffle plates from the tank 11 and through the tube 10. The gases then pass against the wall 4 used to break up the flow and mix the volatilized sulphuric acid (this acid is preferred) and thoroughly mingle the oxide of zinc with it.

From the wall the gases pass to the chamber 16. This is of large size so that there is no blast. At the top, a spray pipe 23 is used for spraying water and cooling the heated gases. The water falls down over the baffle bricks 19 and reaches the bottom and may be drawn off by the valve 24. The liquid obtained is a solution of sulphate of zinc, and if desired, may be pumped back again and used for other sprayings, thus concentrating the liquid.



Method and Apparatus Used for Saving Oxide of Zinc from the Exhaust of a Schwartz Furnace

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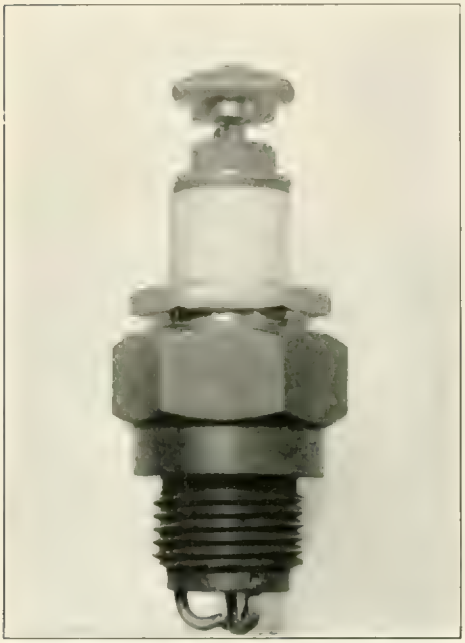
Brass chips made from leaded brass rod usually contains about 2.25 per cent. of lead. No tin is used in the manufacture of this rod.

Dross is not wholly oxide of the metal from which it is obtained. It is the oxide mixed with metal. When the oxide forms it entangles metal from which it does not readily free itself. The oxide with the entangled metal is the well known "dross" of the brass industry.

"Coslettized" Spark-Plugs.

The use of "Coslettizing" for producing a black finish on iron or steel has now become a regular commercial operation, and in England, where the process first made its appearance, it is applied to the finishing of automobile parts. One of the articles so finished (an automobile spark plug) is herewith illustrated. These plugs are made of steel, brass and porcelain. The base, or that portion which screws into the automobile cylinder, is made of steel, and it is advantageous to have a black finish upon it. The Coslettized finish is excellent for this purpose as it is very durable and stands the heat.

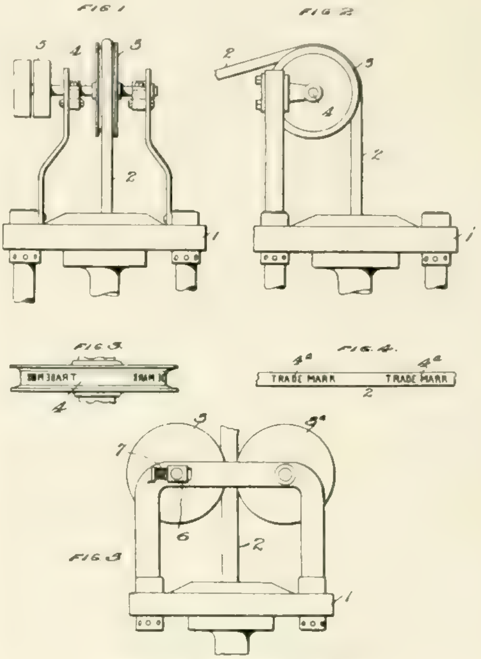


"Coslettized" Spark-Plug.

The method of producing the Coslettized finish on iron or steel is to boil the clean article in a phosphoric acid solution for several hours. The surface is then wiped off without rinsing and oiled with a thin film of boiled linseed oil. The process is patented both in England and in the United States. The spark plug, herewith illustrated was finished by the inventor, T. W. Coslett

A Device for Stamping Lead Pipe.

A device for stamping lead pipe as it issues from the lead pipe press during its manufacture, has been invented by Grafton D. Dorsey of New York City (U. S. Patent 909,376, Jan. 12, 1909) and is herewith illustrated



Device for Stamping Lead Pipe.

As the lead pipe 2 issues from the press 1, it passes over a wheel 3 upon the periphery of which are raised letters. The lead pipe, when it issues from the press is warm and somewhat soft so that the letters are imbedded in the surface as it passes through the groove of the wheel. The manner in which this wheel or pulley is made may be seen by referring to Fig 3. In Fig 4 is a length of lead pipe with the letters imbedded in it by passing over the wheel. In Fig 5 are shown two wheels for marking both sides of the pipe if desired.

Metals which have been annealed and are to be dipped should never be dipped without first pickling to remove the oxide on the surface. A smooth, even surface cannot be obtained unless it is done

Lead Coated Galvanized Iron; A New Product.

An entirely new product in the sheet metal line has recently been patented by G. H. Clamer, of the Ajax Metal Company, of Philadelphia, Pa. (U. S. Patent 909,869, Jan. 19, 1909), and is now being manufactured by them.

This product consists of iron or steel coated with both zinc and lead. In this manner the metal is protected from rusting in a condition never before obtained, and in such a way that painting is unnecessary. The sheet is first coated with zinc and then with lead. The lead forms the outside coating, and the manner of applying it forms the novelty of the patent.

As the base, ordinary galvanized iron is used. It is well known that lead will absorb (alloy with) a small amount of zinc, and *only* a small amount. Mr. Clamer gives this quantity as about 1 per cent., when the lead contains about 4 per cent. of tin. The use of the tin in the lead is not imperative, but allows more zinc to be absorbed.

If galvanized iron be immersed in a bath of molten lead the lead will dissolve the zinc from the surface until saturated. In this manner it is impossible to make a sheet coated with both zinc and lead. But if the lead used for the coating is previously allowed to dissolve all the zinc it will take up, and then used for the galvanized iron, the zinc on the surface of the iron will not be dissolved and a lead coating directly upon it can be obtained.

This process, therefore, consists of coating galvanized iron with lead which has previously been allowed while in the molten condition, to absorb all of the zinc it will take up. A sheet with a coating of both zinc and lead is thus produced.

The lead used may be pure or contain a small amount of tin. The use of this small quantity of tin is recommended by the inventor and about 4 per cent. is preferred. The tin serves to increase the non corrosive properties of the lead, and facilitates the union of the lead and the zinc.

In connection with the foregoing patent, the inventor, G. H. Clamer, makes the following comments:

"In explanation of the patent recently issued to me for coating iron or steel with zinc and lead, I would say that The Ajax Metal Co. have been coating both iron and steel for a great many years with almost pure lead. Such sheets have proved in service to be quite satisfactory if they are kept properly painted. This is especially true of the lead coated iron plates in which the coating is probably more perfect than it is on the steel sheets, and also because of the well known fact that iron corrodes less rapidly than steel under similar conditions.

"As lead is strongly electro-negative to iron, if there are any imperfections in the coating, the corroding action is transferred entirely to the iron. This is also the case with the iron sheets which are coated with tin or tin alloy, the latter being known as 'terne-plate.'

"For this reason it is necessary to paint iron or steel sheets which are coated with all three of these kinds of coatings. If corrosion takes place, the lead coating remains practically inert, while the underlying iron is destroyed. In the form of sheet covered by the patent (the double coated with zinc and lead), the iron is protected by an electro-positive coating, i. e., the zinc, and this coating is in turn protected by an electro-negative coating, i. e., the lead.

"As the coating on the sheets made by the present patent is more perfect than the simple lead-coated iron or steel sheets, a more durable product is obtained. In this improved product, both the iron and zinc are protected by an electro-negative coating, and the iron is in turn protected from corrosion by the presence of the electro-positive coating of zinc." G. H. Clamer.

Philadelphia, Pa

January 27, 1909

Correspondence.

A Day's Work in Molding.

Editor:

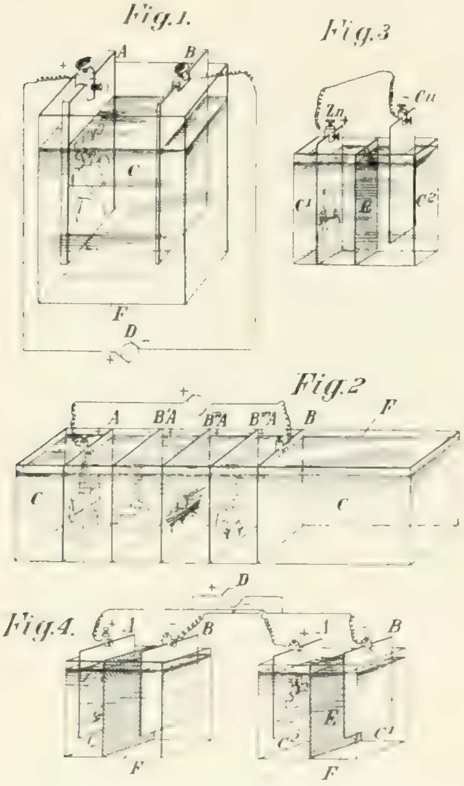
After carefully reading the correspondence of Mr Doherty in the November, 1908 issue of The Brass World I wish to invite said gentleman to explain how it is possible for a molder to make from 90 to 130 molds of regular gated work per day or 45 to 60 molds of loose work in a 12x16 in. flask without the aid of a snap flask or a machine. For one molder to do it seems to me impossible. In my opinion, such a statement without a thorough explanation often results in disagreement between employer and molders.

J. G.

Electrolytic Etching.

A method of electrolytic etching has been invented by Hans Strecker-Aufermann of Munich, Germany, by means of which it is possible to etch plates rapidly and in large quantities at a time. The etching is primarily intended for making plates for printing, but can be used for other kinds of etching.

The plate to be etched, which may be of any desired metal, although copper or brass is generally used, is cleaned and then coated with a layer of chrome glue. This layer is applied in a thin, even coating and allowed to dry. The design on a glass plate, previously made by the photographic method, is printed on the glue plate for a sufficient length of time and is then ready for the etching. The printing is done in the sunlight or its equivalent, the electric light.



Apparatus for Electrolytic Etching.

This method of etching may be understood by referring to the sketch herewith shown. The plate to be etched is shown by A, while the cathode is indicated by B. The plate to be etched is, of course, made the anode.

The electrolyte used for etching is made by dissolving ferric chloride (perchloride of iron) in water so that it stands from 30 to 42 degrees Beaume. A rather weak current is used. From 0.05 to 2 amperes square centimeter is recommended.

Chrome glue when exposed to the light is altered in its properties so that, if sufficiently exposed, it entirely loses its property of swelling. Therefore, when printed under a negative, in the same manner that an ordinary paper photograph is made, the parts acted upon by the light will not swell as much nor as rapidly as those which are not acted upon. When the metal covered with glue is exposed to the light, certain parts are rendered practically incapable of swelling, while others will swell.

When the metal plate thus exposed is placed in the electrolytic solution for etching, the glue swells according to whether it has been exposed to the light or not. Those parts that swell become thicker and the acid does not penetrate as rapidly, while the portions which have not swelled allow the solution to pass through with more speed. The result, after the current has been allowed to act for some time, is the faithful reproduction of the photographic image or design.

The plates are placed in the solution and the current is not turned on until about 15 or 20 minutes have elapsed so that the glue has swelled. The current is then turned on and the etching commenced. It has sometimes been found advantageous to allow the current to act intermittently instead of continuously. After the etching has been completed, the glue is cleaned off with caustic potash or soda.

Lead which contains a few per cent of tin does not corrode as rapidly as pure lead when exposed to the atmosphere.

It is the general practice to use a current of about 1 volt in silver plating. If over this amount is used, the silver is apt to "burn" on the edges of the work and become hard on other parts. Experience has demostrated that about 1 volt or less (some establishments use ¾ of a volt) is the best.

Modern Methods for the Electrodeposition of Zinc, Copper, Nickel and Brass.

By Louis Potthoff.*

In looking back, it does not seem possible that for over 30 or 40 years, during all of which time no important improvements have been made in electroplating in the economical handling of material, that the costly and unsatisfactory method was used of suspending the material to be plated piece by piece on hooks, or stringing smaller pieces on wire, while very small material was placed in wire baskets. It was the only method known for plating this class of articles, and was used in place of something better. It is surprising, therefore, that the improvements subsequently described were not long ago discovered, but it is consoling to know that the work that has been done in evolving the automatic devices for use in electrogalvanizing, has also served to adapt them for electroplating with nickel, copper, brass or bronze. All of these metals are now being satisfactorily done in them.

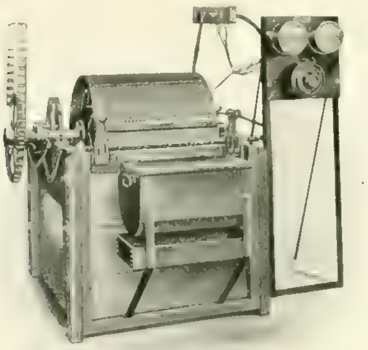


Fig. 1. The Barrel in Operation.

The first progressive step made in the handling of the material in the plating room, was the use of the plating barrel in the electroplating of small metal goods. It was an improvement upon the stringing method to a certain extent; but nevertheless unsatisfactory as the handling in this manner was too expensive besides the continuous loss of solution, due to unavoidable splashing. These features were a great drawback.

Seeing the possibilities of improvements, the construction of automatic handling devices for treating plated work was begun by the company, with which I am connected, some three or four years ago. In these devices herewith illustrated it may be said that fully 90 per cent. of all the material now plated may be automatically handled in them. They are capable of reducing the labor from 60 to 80 per cent., besides producing a perfectly uniform deposit independent of the operator, thus obviating the necessity of employing experienced labor.

After years of experiment and large expense, we have succeeded in constructing the following automatic devices:

1. Automatic galvanizing and plating barrel.
2. Automatic device for the treatment of long material such as bar iron, pipes, etc., from one foot up to any required length.
3. Automatic moving tank for sheet iron.
4. Automatic moving tank for handling miscellaneous material in large quantities.
5. Automatic device for handling wire, chain, etc.

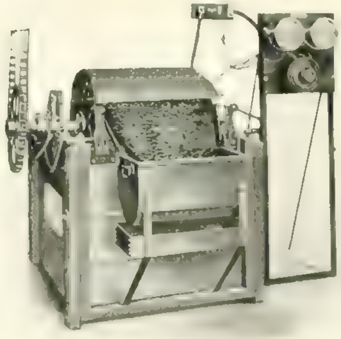


Fig. 2. Manner of Dumping Barrel.

The preceding devices have all been patented and are in constant use in the plating department of our plant where it is possible for those interested to inspect them in operation.

The reader may be interested in the description of the automatic galvanizing and plating barrel in which all kinds of small material can be treated. An automatic washing and drying device as well as one for delivery are connected with this. In Figs. 1 and 2 are shown the device. In Fig. 1 is shown the barrel while the galvanizing or other kind of plating is going on. In Fig. 2 the method of emptying the barrel into the washing receptacle is illustrated. The washing, drying and delivering apparatus is also shown in Fig. 2.

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*President, U. S. Electrogalvanizing Co., No. 1 Park Avenue, Brooklyn.

The operation of a plant is as follows. The galvanizing or plating barrel is provided with a door on the cover through which the material to be plated is introduced. An average filling consists of from 100 to 200 lbs. for galvanizing, and 50 to 125 lbs. for other kinds of plating. The nature and weight of the material determine the quantity used. When the barrel has been filled it is started and revolves in what is known as the "galvanizing or plating direction".

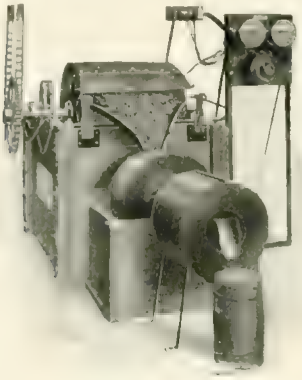


Fig. 3. Showing Drying Barrel.

The time required is dependent upon the kind of plating, nature of the material, and thickness of the coating. From 25 to 50 minutes are generally used. When the material in the barrel is ready to be removed, the motion of the barrel is reversed in what is known as the "emptying direction" by simply shifting a hand lever, whereupon it entirely and automatically empties into the washing receptacle or washing drum. When it is in this drum it remains here to be thoroughly washed and the water is kept clean by an overflow and by running in a fresh supply continuously.

The plating or galvanizing barrel is now again filled, and started as before. When this is done, it reverses the motion of the washing drum. While the second lot is being plated, the first lot is automatically removed into a draining drum and from there to a drying drum. It is then dumped into a keg or other receptacle. The whole operation is simple yet entirely automatic and above all practical. It cannot get out of order because the whole apparatus is of such simplicity that there is nothing to become misplaced or damaged.

When the barrel has been filled there is only one operation and that is the shifting of the lever which starts it. This also operates the drying and washing devices. From the apparatus, the material is delivered in a plated condition, washed and dried ready for shipment. Many of these devices have been installed in this country and abroad. One man and a boy can attend to six of them in which from 4,000 to 10,000 lbs. can be turned out at a labor cost of $3.00. No experienced labor at all is necessary. The sizes of the barrels are variable and are made to adapt them an any desired use. For nickel, copper. brass or bronze, where it is seldom that the large quantities are handled that are treated in electro-galvanizing, a smaller barrel is used. This is about 24 inches in diameter and 2 inches long.

For the plating trade a special apparatus is made for replacing the drum used for drying out electrogalvanized work. In this case means are had for separating the sawdust and also for drying it. A small gas burner or steam coil is used for this purpose.

For etching copper it is customary to use a strong solution of ferric chloride (perchloride of iron). For brass etching a rather weak muriatic solution is used to which some chlorate of potash is added.

Heavy electrodeposits of gold are difficult to produce. The only manner in which they can be obtained is by depositing the gold in a hot solution, until it becomes dull, and then taking out, scratch-brushing and returning to the solution for another deposit. This is repeated for some time until the desired thickness is produced.

Brazed Steel Tubing.

Consumers of steel tubing, particularly those who manufacture metal furniture, cars, and ornamental iron work, will be interested in the brazed square steel tubing which has recently been placed on the market by the Phenix Tube Co. Driggs avenue and N. 11th street. Brooklyn, N. Y.

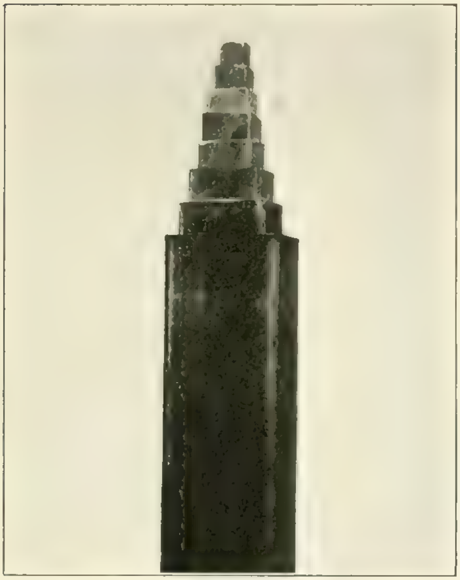


Fig. 1. Square Brazed Steel Tubing.

The high cost of square seamless steel tubing has been instrumental in retarding the consumption of this useful shape, as heretofore nothing but the seamless product could be obtained. The brazed steel tubing now manufactured by the Phenix Tube Co. will, therefore, fill the demand that has existed for a square tubing reasonable in price. This tubing is illustrated in Fig. 1. It is sold at only a slight advance over the round article. In Fig. 2 is shown an additional form of square tubing, which can be used for many ornamental purposes.

All standard sizes of brazed steel tubing are made from ½ in. to 2 in. outside diameter. In addition to this brazed steel tubing, the Phenix Tube Company manufacture round brazed steel tubing, and their regular line of iron lined brass and bronze tubes.

This brazed steel tubing, on account of its low price, will undoubtedly find an extensive use. There are many instances in which a square tube can be used with good results, but the high price of the seamless article has been instrumental in preventing its employment.

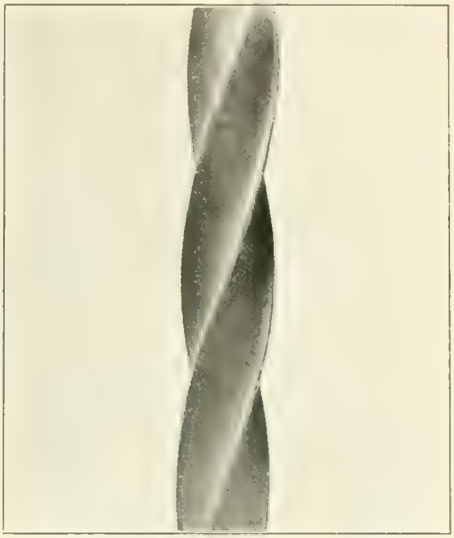


Fig. 2. Twisted Brazed Steel Tubing.

A New Method of Galvanizing.

A new method of galvanizing has been invented and patented by Carl H. Zieme of New Castle, Pa. (U. S. Patent 909,274, Jan 12th, 1909) The process is of the "dry" type and is carried out in the following manner:

The article to be galvanized is cleaned by pickling in the usual manner and the surface coated over with a mixture of 90 per cent of zinc dust and 10 per cent of clay. This is smeared over and the whole is then heated in a closed muffle furnace to a temperature of from 600 to 1000 degrees F. The muffle is filled with a non-oxidizing gas, such as illuminating gas. After heating for an hour or more, the article is taken out and the clay brushed off from the surface. It will then be found that the iron or steel surface is coated with a strongly adherent deposit of zinc.

The "Backus" Improved Plating Barrel.

An improved electroplating barrel has recently been patented by C. G. Backus of the Zucker & Levett & Loeb Co., 516 West 25th St., New York City (U. S. Patent, 908,439, Jan. 5th, 1909.) This barrel is herewith illustrated by a number of sketches.

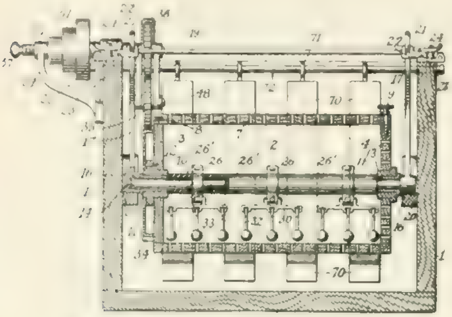


Fig. 1. Front View in Cross Section.

The construction of the barrel may best be understood by referring to Fig. 1. where it is shown in cross section. The barrel itself is shown by 7 and is set in a suitable tank for holding the plating solution. The barrel is made of a suitable hard wood and small holes are bored throughout the periphery to allow circulation of the plating solution. The anodes are shown by 70 and are arranged around the outside of the tank.

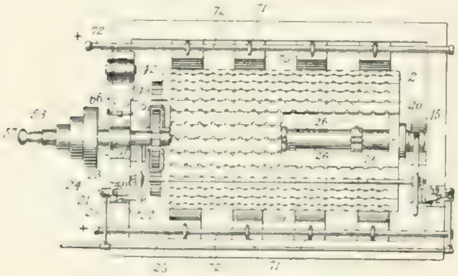


Fig. 2. Top View.

A shaft 26 passes through the barrel and to which are hung the pendants 30, 32 and 33. These pendants are ball shaped and act as the conductors to convey the current to the work. They reach nearly down to the bottom of the barrel so that as it revolves, the articles that are being plated come in contact with them and form a good connection.

The shaft from which these pendants hang is provided with insulating collars so that it will not receive a metal deposit

The connections are made through the rods 10, etc., from which the current passes to the plating solution. The motion of the barrel is stopped by means of a clutch 57 at the end of the cone pulley used for driving the barrel. The knob 57 is simply pulled out and given a quarter turn to release it from the shaft. A spring holds it in place.

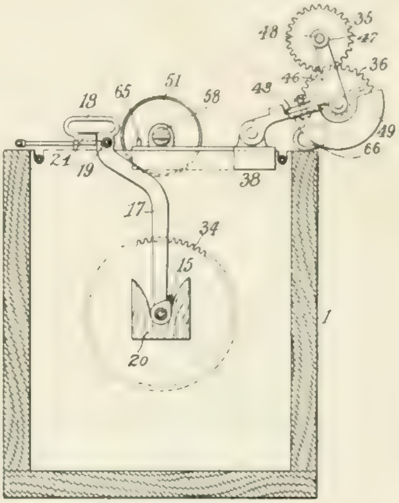


Fig. 3. End View.

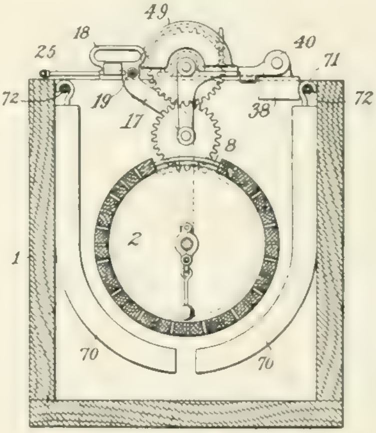


Fig. 4. Position of Anodes.

The manner of removing the barrel from the tank is one of the novel features of the invention. This is done by simply taking hold of the handles 18 and lifting them upwards, after the gears 35 and 36 have been thrown back out of the way. In large size barrels, or where the barrel is filled with a large number of articles, the handles 18 are attached to a simple block and fall over the machine and are raised with it, after which it may be transported to any part of the shop.

A novel portion of the barrel is the manner of setting the staves. The holes are off set so that the work that is being plated will not pass through, although it may be small enough to enter a hole.

New Books.

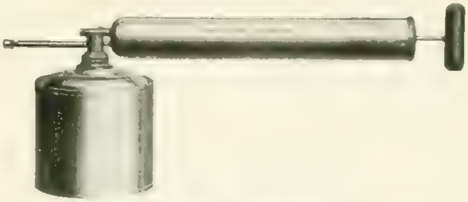
PRACTICAL ELECTROPLATING—By W. L. D. Bedell, Newark, N. J. 244 pages. 110 illustrations. A guide for the electroplater, giving complete instructions for the arrangement of the shop, the installation of the plant, polishing, plating, buffing and lacquering. The author modestly states that the book is intended for the beginner in electroplating, but the experienced plater will find many things of interest in it.

This book is one of the best elementary treatises on electroplating that has yet appeared in the English language. Not only does it treat of plating, but the preliminary polishing and final lacquering. It is a book that should be in the hands of every plater and those who desire to begin electroplating cannot afford to be without it. It contains much new matter never before published. Particular attention has been paid to the management of dynamos, and the use of the electric current together with explanations of the various electrical terms. There is much information on barrel plating, never before published, and which will prove invaluable to the plater in this line of work. A number of pages are devoted to the prices charged for electroplating a large number of articles such as knives, watch cases, spoons, lamps, saddlery hardware, church work, hollow ware, badges, buttons, faucets, bits, etc. etc. This information has never been given in any treatise on plating, and will prove of much value to the jobbing plater for determining the price that he shall charge for his work. *The price of this book is $2.00 postpaid.*

A Unique Hand Sprayer for Applying Lacquer.

A very simple and inexpensive device for applying lacquer to metal goods, is now being manufactured and put on the market by the Voelkner & Harry Mfg. Co., 123 Woodbridge street, West Detroit, Mich. It is herewith illustrated.

The device is intended to obviate the need for an air pump or power apparatus, and the whole appliance is self-contained and easily operated by hand. It has a quart reservoir of either heavy tin or brass, as may be desired and the pump is attached to it. This pump is very compact and durable, and a continuous spray is thrown. The siphon tube is made of brass, and all other working parts are likewise made of the same metal. The valve and nozzle, the essential features of the appliance, are practically indestructible.



Hand Sprayer for Lacquer.

The spray is created by the use of a check valve which automatically holds the air pressure in the reservoir. This check valve is contained in the valve seat of the plunger tube. The pump may be unscrewed with one operation, so that the reservoir is readily filled.

The use of the spraying devices for applying lacquer is now becoming extensive, and their value is fully appreciated. All the advantages of dip lacquering, with none of the disadvantages, are obtained by the use of the spray method. This hand sprayer, therefore, will fill a demand for an inexpensive appliance for applying lacquer to metal goods. Many uses for it will be found in the manufacture of metal goods, and one of this character is in the plant of the Universal Button Co., of Detroit, Mich., where buttons are lacquered as they are being tumbled in tumbling barrels.

In addition to use in spraying lacquer this device is used for spraying molds in brass foundries, and many other purposes in which a liquid spray is desired.

How to Make a Cyanide Copper Solution and the Manner in Which it Should be Used.

Fifth Paper.

Free Cyanide.

The regulation of the free cyanide is the most important part of maintaining a cyanide copper solution. If too little is used the anodes will coat over and the solution refuse to deposit metal. On the other hand, too large a quantity will prevent the deposition of the metal and the formation of blisters. It is a rule in plating to keep as little free cyanide as it is possible to use and still have the anodes keep clean.

If a copper solution, which has been made up by dissolving all the carbonate of copper that the cyanide in it will take up, be used for plating, it will be found that the deposit starts off well. In a short time, however, the voltmeter will begin to show that the current is growing weaker. The anode becomes coated with a green slime and the copper deposit begins to darken. The current finally grows so weak that it almost stops. The whole cause of this difficulty is the fact that the anode becomes coated over with a basic cyanide of copper which impedes, and finally prevents the passage of the current. It is equivalent to coating the anode over with varnish.

On the other hand if the solution contains some free cyanide, although not a sufficient quantity for good working, the anode will keep clean for a longer time, although it will gradually coat over and impede the passage of the current. The right quantity of free cyanide is obtained when the anodes remain clean at all times. As a large excess of free cyanide will maintain them in a clean condition as well as a less quantity, the experience and intelligence of the plater are required in ascertaining whether the proper amount is present.

The amount of free cyanide in a copper solution is regulated by the amount of copper in it. For ordinary work, when the solution contains from 3 to 4 oz. of copper to the gallon, from 4 to 5 oz. of free cyanide are used; but if the solution contains only 1 oz. of copper it would be unwise to use the same quantity of free cyanide. It is usually customary to have a little more free cyanide in the solution than there is copper, but this point depends somewhat upon the conditions under which the plating is done. A solution that is worked hard, i. e., by the use of the maximum amount of current, requires more free cyanide than one that is run with less current. The reason for this fact is that the anode is attacked rapidly when a strong current is used, and the free cyanide in the solution does not have the opportunity to dissolve the basic cyanide of copper formed on it. An agitated solution allows this to take place to a better advantage, and when such a solution is used less free cyanide can be used than in a still one. On the other hand, when a weak current is used, the green slime at the anode has ample time to dissolve so that the copper remains clean.

It will be readily seen, therefore, that the amount of free cyanide necessary in a copper solution depends upon the manner in which it is run and the quantity of copper it contains. To lay down any rule or stipulated quantity would be misleading. The plater will have to judge for himself and in the manner subsequently indicated. It should always be the rule, however, to use just as little free cyanide as possible. The best results are not only obtained by it, but the deposit forms faster. The more free cyanide a solution contains the less rapidly the deposit forms. Were it possible to plate without any free cyanide, the copper would deposit better and more rapidly, but in practice this is impossible.

In making up a new copper solution it is well at first to have practically no free cyanide, or at least very little. The best condition is when the anodes gradually coat over. Now add some cyanide to the solution and thoroughly mix up. The cyanide should be dissolved in water as a strong solution. This can be made by dissolving 4 lbs. of cyanide in 1 gallon of water. Add a small quantity of this cyanide solution, stir up, and then try for a while. If the anodes still coat over more should be added and so on until enough has been obtained. By following this rule, it is possible to adjust the quantity of free cyanide to any copper solution, and it is the method almost exclusively followed in the plating trade. The only object of free cyanide is to keep the anodes clean, and when a sufficient quantity has been obtained to satisfy this requirement, no more is needed.

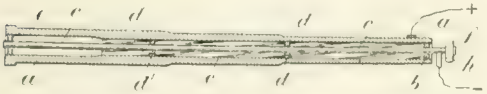
After a solution has been run for some time, the quantity of free cyanide increases, so that a greater quantity is present in the solution. To overcome this excess, some carbonate of copper is added to it. This gradual accumulation of free cyanide is particularly the case in solutions that are worked "hard," i. e., with a strong current as the copper is deposited rapidly and is not fed from the anodes as rapidly as it deposits. This is also the case when an insufficient number of anodes are used.

The presence of too much cyanide in a copper solution is shown by the manner in which the deposit forms. When a large excess is present, the deposit will not form at all. When a less quantity is in the solution, the copper deposits very slowly. These two indications must be carefully noted. If a solution stands at the right degree of the hydrometer, and still refuses to deposit (assuming that the current is of sufficient strength and the connections clean) it indicates that there is altogether too much free cyanide in it, and carbonate of copper must be added. When this has been done, the solution will usually start to deposit copper right away.

(*To be Continued*).

Stripping Copper and Brass from Steel.

A new method of stripping copper, brass and other similar metals from iron and steel has recently been patented by a number of men connected with the Kings Norton Metal Co., Ltd., of London, England (U. S. Patent 908,937, Jan 5 1909). The process is intended to remove the copper, brass or cupro-nickel that fouls the interior of a gun barrel after firing. The method is an electrolytic one and consists in employing a solution for the electrolyte and making the gun the anode. The manner of carrying out the process may be understood by referring to the illustration.



The gun, designated by *a* is filled with the solution subsequently described, and an iron or steel rod passed through for use as the cathode. This rod is shown by *c*. The electric current is then passed through in the same manner as in electroplating, and the copper or other material is dissolved off without attacking the steel surface at all. It is deposited upon the rod. Suitable means, of course, are used to insulate the rod from the gun.

The solution employed for the stripping consists of the following:

Water	83 gallons
Strong Ammonia ...	15 gallons
Glacial Acetic Acid	2 gallon

A current with a pressure of from 5 to 10 volts is employed.

Correspondence.

Annealing Copper and Muntz-Metal.

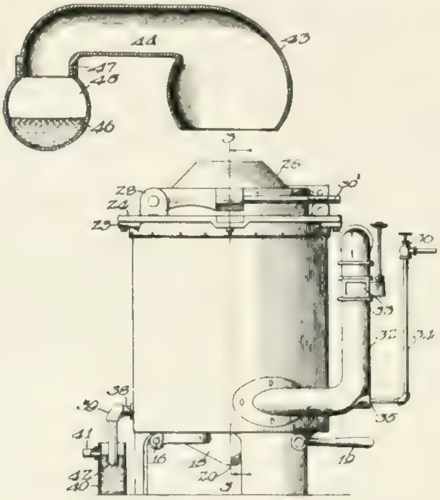
The writer was very much interested in the article in THE BRASS WORLD, January, 1909, page 3, on increasing the tensile strength of aluminum-bronze and Muntz-metal by quenching. For quite a number of years the writer folloewd the trade of coppersmith in which it was necessary to anneal the copper, brass, Muntz-metal and German-silver used, and while the commonly accepted understanding is, that to soften these metals, it is necessary to quench them, our experience always taught us in the trade that even sheet copper would be better were it left to cool itself.

With yellow brass, Muntz-metal and German-silver, it was found preferable if, on annealing, these metals were kept entirely protected from atmospheric conditions. One method we followed, was to cover the article with sawdust and gradually bring the same to a light red heat and then cover it up completely with sawdust and leave until the whole was cooled off. This method, however, was found to be somewhat difficult except in the case of small articles. The writer has proved many times that metal which could not be worked when hot in an open fire or quenched or allowed to cool, could be easily worked into any shape when annealed under the conditions named. Perhaps this suggestion may be of value to others in the trade. [illegible]

Pin holes in yellow brass castings or in composition castings are frequently caused by the use of too much phosphor tin or phosphor copper in making the mixture. When there is any zinc in a mixture, very little phosphor tin or phosphor copper can be used. An ounce or two to 100 lbs. of metal is all that can safely be employed. When no zinc is used in a mixture a much larger quantity of these phosphorus alloys can be employed.

A Gas-Generating Crucible Furnace.

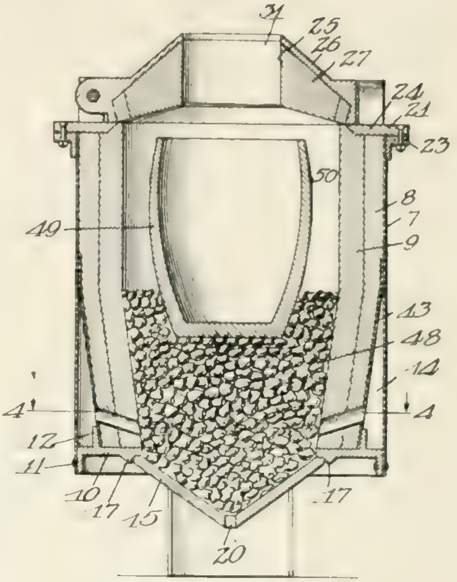
Economy of fuel has always been one of the chief desires of the crucible furnace inventor, and E. H. Schwartz, of Chicago, Ill., the well known furnace expert, has invented a crucible furnace (U. S. Patent 910,091, Jan. 19, 1909) in which economy of an unusual kind is obtained. This furnace, while in use, generates gas which may be used for driving a gas engine.



Schwartz Gas Generating Crucible Furnace.

The furnace used, as illustrated in Figs. 1 and 2, is of the regular type in which coal or coke is used. The fire is fed with a blast. Both steam and air are used for this purpose Referring to Fig 1, the air is forced through the pipe 32 while steam passes in through the pipe 31 By the use of both steam and air better combustion of the fuel is obtained.

Over the top of the furnace a hood 43 is set to carry off the gases. This hood leads to a pipe 45, and in the bottom of which water 46 is constantly flowing This serves to cool the gases and also to collect the zinc oxide fumes which pass over. In Fig 2 the detailed cross-section of the furnace is shown and the manner in which the crucible is held. The furnace itself is of a slightly different type from that generally employed in brass melting, and has novel methods of lifting the cover and dumping the grate. The desire of the inventor seems to be to obtain the greatest economy of fuel.



Cross Section of Furnace.

Producing a Red-Brown Color on Yellow Brass.

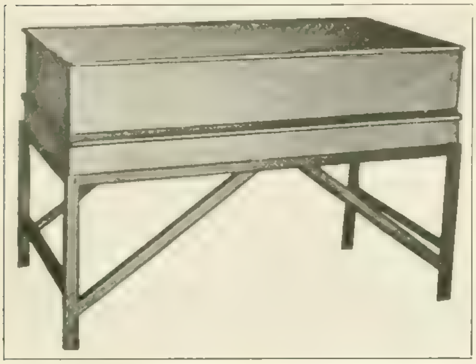
Brass articles that have been exposed to the atmosphere for a long time frequently have a reddish-brown color that is quite pleasing. As it is frequently desired to imitate this color, the following method will be found excellent:

Make a very strong solution of the purest caustic potash obtainable, in clean water. This solution may stand anywhere from 20 to 30 degrees Beaumé and the stronger it is the more rapidly it will work. Heat to boiling in a clean iron kettle. Place the yellow brass articles in it and allow them to remain for several hours. After this has been done, remove, rinse and scratch-brush dry. The brass will be colored reddish-brown. A cold potash solution of this strength can also be used, but a much longer time is needed From 24 to 36 hours are usually required for it

The success of this operation lies in having the potash very pure and strong Potash which has grease dissolved in it, or that which contains considerable carbonate does not work well. The strong, pure, hot potash attacks the surface of the brass and produces a reddish brown color If it is used weak, the color is difficult to obtain on account of the slight action

The "Steiner" Sawdust Box.

As every plating establishment is obliged to use sawdust, a good sawdust box is a very satisfactory appliance. Emil F. Steiner, 58 Union St., Newark, N. J., the well known maker of lacquering and drying ovens has recently placed on the market a new form of sawdust box that will meet with the approval of all platers. This box is herewith illustrated It is made of heavy galvanized iron and supplied with angle iron legs and braces. The box itself is made in a very substantial manner and will last a lifetime. The top edge is rounded and thus the hands and arms of the plater are not injured in any way while drying out work.



The "Steiner" Sawdust Box for Drying Out.

The boxes are all made of the uniform height of 32 inches, but may be had in five sizes, varying in length from 24 to 48 inches and in width from 18 to 24 inches. The boxes are fitted either with steam coils, or where steam is not obtained or desired, with a special gas burner. The use of this burner enables the box to be used under all conditions.

An Improvement in Sherardizing.

The process of "Sherardizing," also known as "Dry-Galvanizing" consists in heating iron or steel in zinc dust at a temperature slightly below the melting point of zinc. An inert gas, such as illuminating gas, is used to fill the receptacle in which the galvanizing is done. The work, in some cases, is tumbled.

According to a recent patent issued in the name of F. W. Gauntlett and assigned to the Sherardizing Syndicate, Ltd., of London, England, (U. S. Patent 910.369. Jan. 19. 1909.) it has been found advantageous to mix sand with the zinc dust used in the galvanizing process. A mixture of 9 parts of sand and 1 part of zinc dust is advocated and the iron or steel to be galvanized is heated to a temperature of about 700 degrees F. for about one hour. The saving in the cost of zinc dust, and the improvement in the character of the zinc coating on the iron or steel are the features of this new process

Short Circuiting in Nickel Solutions.

As it is impossible to keep a nickel solution free from sediment, this material is constantly accumulating and settles to the bottom of the tank. Some platers clean out their tanks at frequent intervals, while others allow the sediment to accumulate until it reaches up to the work that is being plated. In some instances, it has been found that it even covered the work to a considerable depth. In this case the nickel deposit around the parts was quite rough and discolored.

In addition to the difficulty of rough and discolored work, the accumulation of sediment in a nickel tank has another bad feature. It is apt to short circuit the tank. It consists of particles of metallic nickel and iron, together with the hydroxides of both metals and some tin. At any event, it is a much better conductor than the solution itself and when it is allowed to rise to a height that covers the bottom of the anodes and work, short circuiting is apt to result. There are a number of instances known where a dynamo was found to be overloaded without apparent cause, but when the matter was investigated, it was found to be brought about by the accumulation of sediment that produced the short circuiting.

Manganese bronze should be cast in sand that has been worked as dry as possible. Wet sand is more apt to cause a "blow" which will agitate the metal. An agitation in melted manganese bronze always produces dross.

Questions and Answers.

QUESTION No. 584. What effect will potassium cyanide have on sterling-silver when used as a flux? We understand that it is an excellent flux for melted metals, and it has occurred to us that possibly it might have a good effect on sterling-silver. Do you know of anyone who is using it?

Answer. Potassium cyanide is one of the most efficacious and energetic fluxes known, as it has a strong reducing action. It has a good effect when used on melted sterling silver and promotes soundness and malleability. It is objectionable, however, for the reason that it becomes quite fluid and is skimmed from the crucible with difficulty. It also attacks the crucible strongly and is rather expensive. We do not know of any sterling-silver manufacturer who is using it. It has been found that cadmium produces the same results without the disadvantages of the potassium cyanide.

QUESTION No. 587. What is the best substance to use in etching steel? I have tried strong nitric acid, muriatic acid and oil of vitriol without success.

Answer. Dilute nitric acid is the best for the purpose and is generally used. One part of acid is mixed with 4 parts of water. If used stronger, the "resist" will not hold, although the etching will be more rapid. The best results are obtained when the acid does not "bite" too readily, and the 4 and 1 mixture has been found by experience to give the best results.

QUESTION No. 588. We have an inquiry for 400 bolts, 4 feet long and 3/4 to 1 1/4 in in diameter. The specifications are as follows: "Material shall be of Naval Brass, of a composition conforming to the Navy Department's specifications and manufactured by the 'Extrusion' process. It shall have a strength of at least 55,000 lbs. per sq. in., and an elongation of not more than 28% nor less than 20% in 8 in. It shall be of such a nature that heads may be easily forged on the bolts, and after forging the heads, the strength and elongation shall be specified." Will you inform us regarding the composition of "Naval Brass," and whether it can be cast in sand to make some washers to go with the bolts?

Answer. The composition of "Naval Brass" is variable, depending upon the character of the work. The Navy Department specifies according to the requirements, but it is usually confined to brass mixtures that can be worked hot, and either with or without the addition of a small amount of tin. The mixture that is used for making brass rods by the "Extrusion Process" consists of 55% of copper and 45% of spelter. If greater hardness is desired, a small amount of tin is employed, but it is not used for the majority of work. This mixture is quite soft while hot and works well in the extrusion machine. It is also strong while cold and will answer the specifications. At the present time, there are only two concerns in the United States making rods by the extrusion process.

You will not be oble to cast the washers in sand from the extrusion mixture, unless you add a small quantity of aluminum to it. The quantity of spelter is too much for successful sand casting without it. We suggest adding about 0.50% of aluminum and the same amount of tin to harden it. You will then have a mixture that will cast well in sand and resemble manganese-bronze. It will also conform to the specifications.

QUESTION No. 589. We would like to obtain a solution for lead plating tempered steel, and have been unable to find one. The solution would have to be run cold in order to prevent removing the temper.

Answer. The most satisfactory lead solution, is one made as follows:—

Water	1 gal.
Caustic Potash	8 oz.
Litharge	1 oz.

Dissolve the caustic potash in water, and then boil it with litharge (litharge is yellow oxide of lead). The boiling should be continued for ten or fifteen minutes and the solution is then allowed to cool and settle. Some of the litharge will not dissolve. The clear liquid is either poured off or drawn off with a siphon and is ready for use. The solution is used with a lead anode and may be used cold, although it works more evenly if run warm. A rather weak current is used and the deposit not allowed to become too thick as it then becomes spongy. A light deposit is the best. As far as known there is no commercial use of lead plating.

QUESTION No. 590. What is the best method of producing a gun metal finish on small brass castings?

Answer. To obtain a gun-metal finish on your castings, you will have to first copper plate them and then dip into a solution made by dissolving 2 oz. of liver of sulphur in 1 gallon of water. Use cold and after rinsing, scratch-brush with a soft, brass scratch-brush and then lacquer. A black-nickel deposit is also used for the gun-metal finish, and while neither the liver of sulphur nor black nickel deposit is the genuine gun metal, they are extensively used as such and when well done give excellent results.

QUESTION No. 591. I wish to make some castings about 7 in long and 1/2 to 3/4 in in thickness. They are of flat-iron shape. The metal that must be used should melt at about 1,200° F. The castings should have the hardness of cast iron, but take a better polish. What can I use for the metal?

Answer. Pure aluminum melts at about 1200° F., but is too soft for your work. By alloying it with 10% of copper you will obtain a hard metal (90 lbs. of aluminum and 10 lbs. of copper), which may possibly answer your requirements. A mixture of equal parts of copper and zinc to which about 4 oz. of aluminum have been added to every 100 lbs. of the mixture, is also suitable as it is hard and melts at a low red heat or approximately the temperature you desire. We do not know your exact requirements, as your question is somewhat vague and cannot be answered very intelligently.

QUESTION No. 592. Is the smoke finish used to any extent in producing ornamental metal work?

Answer. The smoke-finish is now used very extensively by lamp and chandelier manufacturers for producing a brown and shaded finish that is very pleasing. The shading thus produced cannot be made by any other method. It is done by a smoky flame and dip lacquering. The lacquer, strange as it may seem, does not disturb the smoke on the work. Any metal may thus be treated.

QUESTION No. 593. What is the cause of the so-called "green drip" on brass work that has been lacquered?

Answer. The green drip is usually caused by the presence of acid in the lacquer, which attacks the brass and stains the lacquer, but instances are known in which acid remaining in the pores of castings or similar work after dipping causes it. At any rate, acid is the cause of it.

QUESTION No. 594. We have a quantity of aluminum wire and cable, and would like to make sand castings of it to replace brass. We have our own foundry, and wish you would give us the necessary mixtures.

Answer. We do not know what kind of castings you desire to make, but the following mixtures will give you a good variety for nearly every kind of work.

For work not requiring the utmost strength. Has the best casting qualities of any of the mixtures as it is less apt to crack in the mold. Aluminum, 93%, copper, 7%.

For the majority of work requiring lightness and strength: Aluminum, 80%; zinc, 15%; copper, 5%.

For the strongest castings: Aluminum, 67%; zinc, 33%. You can read pounds for per cents, if desired, and obtain working weights.

QUESTION No. 595. When the brass work that we are copper plating in our copper solution (cyanide) comes out, it has a dark brown surface. When scrubbed, however, it shows a good copper surface. The solution stands 20 degrees Beaume and was made of carbonate of copper.

Answer. The use of about 2 oz. of bi-sulphite of soda to each gallon of your solution will overcome the dark brown color on the copper deposit and render it bright. We think your solution is also too strong for your work and suggest adding water to bring it down to about 12 or 15 degrees Beaumé.

QUESTION No. 596. In a recent issue of THE BRASS WORLD, the matter of gating globe valves in a certain way was mentioned. Can you inform us more about this point and what is the best place to gate them?

Answer. Globe valves, or any other kind for that matter, must be gated in a location where the gate may be easily cut off. It is usually customary, therefore, to gate a valve on the end of one of the hexes. The gate, then, can be easily sawed off close to the valve. If the valve is gated at any other place, it is difficult to make a good job of cutting off and a stub end of the gate is left on the casting. This must be ground off with the accompanying loss of time and metal.

QUESTION No. 597. How can a good, bright nickel finish be obtained on nickel-plated steel wire in the form of garment hangers? I always roll the work first before plating in a solution of sal-soda in water. I then give a fair coat of nickel which is very white and as good as any I have seen. I then roll in leather to give a bright finish. The hangers, however, do not come out as bright as some which are made in an Eastern factory and I would like to know where my trouble is.

Answer. If you will use a small quantity of dry Vienna lime in the tumbling barrel with the leather, you will be able to obtain a high "color" on the nickel. It is possible to obtain, in this manner, nearly as good a "color" as that obtained by buffing.

QUESTION No. 598. What effect will copper have on a mixture of lead and antimony? We wish to make a harder mixture, if possible, than can be obtained from lead and antimony alone.

Answer. A small amount of copper, from 0.50% to 1.00%, slightly though not materially hardens the lead and antimony. A larger quantity thickens the metal by increasing its melting point. Copper is not used to any extent, therefore, for this purpose, and can be employed only in small amounts. It is questionable whether it is of any advantage.

QUESTION No. 599. Is it possible to make a copper ball, used as the float in flush tanks, by copper plating a wooden one? It seems to me that it could be used in place of the ones now made of sheet copper and with better results.

Answer. This method of making a float ball has been tried many times and we do not know of anyone who is now making them. It is quite difficult to obtain a copper deposit on the ball that will not crack or leak. With a heavy deposit, the cost is greater than that of a ball made of sheet metal.

QUESTION No. 600. Noting in a recent number of THE BRASS WORLD that quartz crucibles will not crack when suddenly cooled, I wish to ask why this is so, and also if the crucibles are used at all?

Answer. The reason why quartz crucibles do not crack is that *fused* quartz, of which the crucibles are made, has practically no coefficient of expansion. The crucibles are too expensive for regular use and are used only in laboratory work and in experiments.

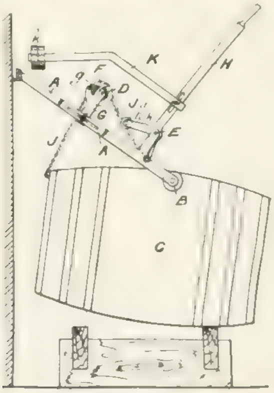
Patent Abstracts.

[illegible], Dec. 15, 1908. PROCESS OF UNITING METALS. Everett D. Holley of Forestville, Conn., and Chas. L. Root of Bristol, Conn. A method of combining iron and copper by first applying molten zinc to the surface and then molten copper. The zinc allows the union to take place.

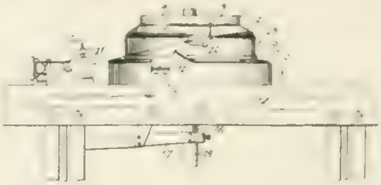
908,005, Dec. 29, 1908. BURNER FOR EXPLOSIVE GAS MIXTURES. Hermann [illegible] of Berlin, Germany. A burner for use with oxy-acetylene or other gases containing oxygen. The object of the invention is to provide a burner that will allow a number of different sized flames to be employed without changing the nozzle.

910,804, Jan. 26, 1909. MAGNETIC SEPARATOR. Chas. M. Green of Lynn, Mass. Assignor to the General Electric Company. The material is passed between two toothed rolls that are magnetized, and which causes the magnetic material to be withdrawn from the remainder of non-magnetic matter and then fall into a separate compartment.

908,019, Dec. 29, 1908. TILTING BARRELS. James Lynch of Manchester, England. A device for tilting a barrel so that the contents may easily be poured out. The construction of the device may readily be understood by referring to the sketch.



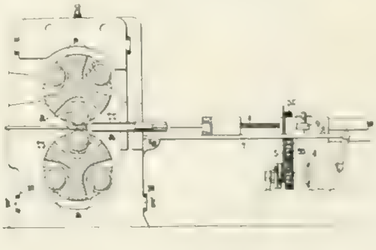
909,117, Jan. 5, 1909. GUARD FOR WIRE BLOCKS. John H. Reese of Joliet, Ill. Assignor to [illegible] & Son of the same place. The guard is designed to prevent the wire, should it happen to break while being drawn, from flying into the operator's face. In heavy sizes accidents of this kind are not uncommon. The guard is shown in the illustration by 9 so that when the wire breaks or passes through the die, the end is prevented from flying.



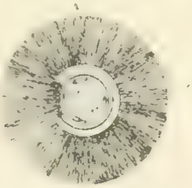
907,840, Dec. 29, 1908. MELTING FURNACE. G. A. Menendez of Chicago, Ill. Assignor to the Goss Printing Press Company of the same city. A furnace for melting soft metal, such as stereotype metal, and forcing it into the mold. A pump is a part of the furnace.

909,283, Jan. 12, 1909. ALLOY. Joseph F. Clapp of Los Angeles, Cal. An alloy having, the inventor says, great hardness, toughness and resistance to corrosion. It consists of 40 to 90 parts of iron, 1 to 30 parts of iridium, 0.2 to 10 parts of platinum, 1 to 15 parts of molybdenum, 0.5 to 15 parts of copper, and 0.5 to 15 parts of nickel.

908,320, Dec. 29, 1908. MANUFACTURE OF METAL TUBES AND THE LIKE. Henry Reinhard of Birmingham, England. A piercing machine for forming tube shells from a solid billet, and which are afterwards to be drawn into tubes. The billet is pierced hot by pushing against the piercing head.



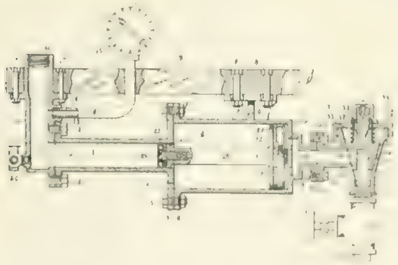
909,204, Jan. 12, 1909. ROTARY BRUSH. Henry Nielsen of Cleveland, Ohio. Assignors to the Osborn Mfg. Co. of the same place. A bristle in which a series of sections are clamped into one larger brush. The novelty of the invention lies in the manner of making the hub.



909,813, Jan. 19. 1909. GRINDING OR ABRADING WHEEL. Ezra F. Landis of Waynesboro, Pa. A grinding wheel with a series of grooves in the face so that a shearing action is produced during the grinding.

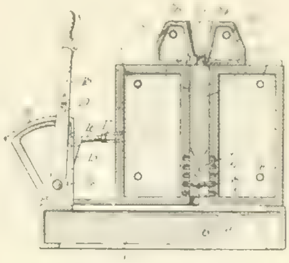
908,908, Jan. 5, 1909, TOOL FOR DRESSING EMERY WHEELS. Frank Trier of Westminster, London, England. A tool with a number of wheels on the spindle at the end which are used to bear against the wheel. These are set "skew." A shearing action is thus produced.

909.950, Jan. 19, 1909. TESTING APPARATUS. Frank Schreidt of Mansfield, Ohio. An appliance for testing valves or similar objects. The apparatus may be set at a predetermined pressure and the valve tested at this amount. The appliance is designed to obviate the necessity of using a high pressure boiler for testing valves.



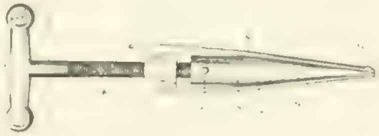
909,580, Jan. 12, 1909. METAL SHEET PREPARED FOR PUNCHING. J. R. Harbeck of Detroit, Mich. Assignor to the Kemiweld Can Co., of the same city. A method of preparing sheet metal for stamping so that there will be as little waste as possible. The sheet is marked so that portions not utilized for one kind of article may be used for another.

910.476, Jan. 19, 1909. MULTIPLE MOLD. F. H. Seidel, of Harvey, Ill. A water jacketed mold, designed primarily for casting sash weights but applicable for other purposes. It is made to come apart by pushing the lever 18 and to clamp together by the reverse operation.



910,350, Jan. 19, 1909. CUTLERY GRINDING MACHINE. W. J. Bastian of Chicago, Ill. Assignor to the Amrican Cutlery Company of the same city. An improvement in cutlery grinding machines in which the work holder is mounted on the frame so that it may be reciprocated and thus move the cutlery to and fro across the wheel.

909,150, Jan. 12, 1909. MOLDERS' TOOL. James H. Casson of Detroit, Mich. An improved tool for removing wood patterns from the sand. The handle is used as a hammer for rapping, and the point holds a screw which may be replaced whenever necessary. The handle allows the pattern to be easily drawn from the sand.



909,544, Jan. 12, 1909. MACHINE FOR POLISHING KNIFE HANDLES. Wm. J. Carney, of Norwich, Conn. A machine for polishing the handles of steel knives. The polishing is done between two polishing belts and an oscillating motion is given the carrier.

Trade Items.

The plant of the Standard Galvanizing Co., at West Pittsburg, Pa., recently destroyed by fire, will be rebuilt.

The Wilkinson-Knupp Brass Co., will erect a brass foundry at Greenville, Penn., for the manufacture of valves and similar steam goods.

The Selby Smelting & Lead Company, San Francisco, Cal., lead smelters, have begun the manufacture of a line of babbit metals and have placed a number of grades on the market to suit the different requirements.

The business of Johnson Bros., of Providence, R. I., manufacturers of sterling-silver hollow-ware, has been purchased by Fessenden & Co., of that city, the well known manufacturing silversmiths.

The Chatham Electroplating Works has been started at Chatham, Ont., Canada, by P. W. Burk and G. R. Speed. Their factory is located at 1 Lacroix Slip. The proprietors have had seven years experience in the electroplating line, and all kinds of jobbing plating will be carried with particular attention paid to refinishing jewelry and high grade goods.

The Eureka Pneumatic Spray Co., 400 Canal St., New York City, desire to call the attention of the trade to the fact that the original "Eureka" Sprayer for lacquer, paints, bronze, enamels etc. is patented, and that infringers are liable for damages whether users or sellers. The Eureka Pneumatic Spray Co. were the pioneers in the use of the spraying process for applying lacquers.

The Electric Construction Co., 117 West 4th St., Little Rock, Arkansas, have opened a factory for the manufacture of gas and electric lighting fixtures and will carry on electroplating, polishing and lacquering. They would be pleased to receive catalogues and prices of spun metal work and brass castings suitable for chandeliers and the other goods manufactured by them.

Robert J. Taylor, Inc. are one of the oldest manufacturers of graphite crucibles in the United States, and have an enviable reputation for their goods. Their customers invariably report satisfaction, and the uniformity of their goods is one of their chief characteristics. This company prefer to refer to their customers for the quality of their goods, as they have found that they are [illegible] well recommended.

The patent granted to the late Wm. A. Wagner for metallizing and plating roses and other flowers has been sold by his estate to the [illegible] Mfg. Co., of East Syracuse, N. Y. The claims of this patent are for the use of an [illegible] on the flower, and the process of burning out the interior after electroplating so as to prevent spotting out. It is reported that the price paid was $1,000, with a royalty on the sales.

The Jewel Motor Car Co. has been incorporated at Massillon, Ohio, with a capital stock of $250,000 to manufacture automobiles.

The National Lamp Co., of Warren, Ohio, will shortly build a new factory, 75 x 150 feet, for the manufacture of tungsten lamps.

The Mitchell & Van Meter Co., of Pottstown, Pa., manufacturers of plumbers' brass goods, are to erect a new brass foundry 40 x 75 feet.

The Apex Mfg. Co. has been incorporated at Cleveland, Ohio, with a capital stock of $25,000 to manufacture plumbers' brass goods. The office is at 1308 Addison Road.

George Guggenheim, formerly foreman of the plating department of the Holmes & Edwards Silver Co., Bridgeport, Conn., has started a jobbing electroplating shop at 363 Wilmot Ave., in this city.

The Arts & Crafts Shop has been started at Urbana, Ohio, to manufacture metal goods and novelties. F. A. Zimmer of Buroker & Zimmer, attorneys and counsellors, is the president of the company.

The Park City Silver Plate Co., 57 Golden Hill St., Bridgeport, Conn., manufacturers of umbrella and cane handles, will move within a short time to the new building of the Bridgeport Silverware Co., State St. Extension, in this city.

The Wilder Industries has been incorporated with a capital stock of $335,000 to take over the following concerns: The Central Oil & Gas Stove Co., of Gardner, Mass., manufacturers of gas and oil stoves. The Florence Mfg. Co., of Florence, Mass., also makers of the same class of goods; The Meals Printing Company of Gardner, Mass., printers; Boynton & Plumber, Inc., of Worcester, Mass., manufacturers of blacksmiths' tools; and the E. F. Hodgson Company of Dover, Mass., manufacturers of portable houses. The company will act only as a holding one and the office will be at 116-118 Washington St., Boston, Mass. Later some consolidation may result in order to concentrate resources.

A contract, covering the complete furnace equipment for the new locomotive shops of the D. L. & W. R. R. Company at Scranton, Pa., has been awarded to the Rockwell Furnace Co., 26 Cortland St. New York City. The equipment for the furnaces consists of thirty-five of the latest type furnaces operated with 300 B. T. U. water gas made in Loomis-Pettibone producers. These shops will be capable of turning out complete locomotives, and it is expected that operations will be commenced in about three months. They embody the latest and most improved machinery and equipment, and no pains has been spared to make them modern in every respect. They were designed after an inspection of a number of leading railway shops in the United States.

Articles of incorporation have been filed by the Superior Bronze Co., of Wilmington, Del. The capital stock is $10,000.

It is reported that the Dowd Silver Co., of Hoboken, N. J., will move their factory to Wallingford, Conn.

The Taunton River Works of Taunton, Mass., manufacturers or iron, copper and brass rivets, have incorporated their company. There will be no change in the policy of the company.

The Federal Cartridge Co., has been organized for the manufacture of cartridges and will, it is said, build a plant at Roton Point, near South Norwalk, Conn., for the manufacture of these goods. It is stated that the company will also manufacture shot.

The Metal Dross Economy Co., of Bristol, Conn., report a number of sales of their dross saving apparatus during the month of January. They also announce that they have been allowed a patent upon the process of skimming into water which fully protects them from any infringement.

The Delamothe Distributing Company of Spokane, Wash., has beein reincorporated as the Delamothe Company, with a capital stock of $150,000. Additions to the plant will be built so that the production will be greatly increased. The manufacture of metallized roses for hat pins and similar work will be carried on in an extensive manner.

The name of the Geo. W. Dover Company, 36 Garnet St., Providence, R. I., manufacturers of jewelers' findings, ornaments and similar metal goods, has been changed to The Metal Products Co. They are now located in their new office at the above address. A new factory will be built at Thurber's Ave., Eddy & Blundell Sts., during the coming summer that will enable them to keep up with their orders.

The Merkel Light Motor Co., has been formed as a consolidation of the Merkel Motor Co., of Milwaukee, Wis., and the motor cycle department of the Light Mfg. Co., of Pottstown, Pa. A building has been purchased in Pottstown, Pa., and the manufacture of motor cycles, [illegible] and sundries [illegible] already commenced. The consolidation does not affect the business of the Light Mfg. Co., [illegible] of this [illegible] will be conducted separately.

The Dow Chemical Mfg. Co., of [illegible] Ohio, manufacturers of electroplaters' supplies and equipment, and with branch warehouses at Bridgeport, Conn., and Chicago, Ill., have issued the first of their new publication, [illegible]. This will be published each month and will be intended primarily to bring before the [illegible] a description of the goods manufactured by this company. The first issue contains [illegible] and [illegible] articles by such well known authorities on plating as Geo. L. Wallace and H. J. Hawkins. This publication will be sent free of charge to any one in the plating trade and all platers will find much of interest in it.

The Morgan Electric Plating & Mfg. Co., has been incorporated at Pittsburg, Pa., with a capital stock of $25,000 to carry on electroplating.

The American Brass & Mfg. Co., 1st St., and Watson Ave., Bartlesville, Oklahoma, are now making brass castings, special machinery tools and dies, and would like catalogue of anything in their line. This company was recently organized.

The George F. Carroll Plating Co., 51 Bristol St., Boston, Mass., have commenced the manufacture of gas and electric fixtures of a high grade. These fixtures are not intended to compete with the cheap fixtures on the market, but to supply the demand for a better article.

The Bridgeport Pattern & Model Co. Inc. has been incorporated at 143 Cannon St., Bridgeport, Conn. and will conduct the manufacture of wood and metal patterns. They will make a specialty of valve patterns and automobile work. Charles [illegible] is the president and treasurer.

C. H. Talcott & Co., 273 Asylum St., Hartford, Conn., the well known dealers in electroplaters' chemicals, desire to announce to the trade that they have been appointed agents in Southern New England, for "Roberts" potash and which is now being manufactured again in Niagara Falls, N. Y. They can supply the plating trade with this potash in any desired quantity.

At the annual meeting of the Bannatyne Watch Company, 31 Canal St., Waterbury, Conn., the following officers were elected: President, Franklin Farrel, Jr., of Ansonia, Conn.; treasurer, George C. Bryant of Ansonia; secretary and manager, Archibald Bannatyne. Directors: Franklin Farrel Sr., Franklin Farrel, Jr.; George C. Bryant and Archibald Bannatyne.

The success which has followed the use of "Hascoline" Burnishing Compound, made by Hass Bros. Co., 601 Union Bldg., Newark, N. J. serves to indicate that it is all they claim for it. It is used for burnishing small metal work with steel balls and by the use of this compound, the work is highly polished without [illegible]. The [illegible] of Waterbury, Conn., are the Eastern agents.

Henry Christy & Co., 13th. & Race Sts., Philadelphia, Pa., are placing upon the market a new flux called "Metalline" for [illegible] metals in the melted condition. [illegible] it.

The Hendee Mfg. Co. of Springfield, Mass., manufacturers of motorcycles, are planning extensive additions to their works.

The French Mfg. Co., of Waterbury, Conn., manufacturers of small sizes of brass, copper, bronze and German silver tubing, are erecting an addition to their works. This addition is 70 x 80 feet and will increase their capacity.

Aluminum founders who desire to use chloride of zinc as a flux in melting aluminum can obtain the right product from the Sandoval Zinc Co., Chemical Department, East St. Louis, Mo.

The Pierce Arrow Motor Co., has been incorporated to take over the property and business of the Geo. N. Pierce Company of Buffalo, N. Y., manufacturers of automobiles. Additional capital will be provided.

The Connecticut Computing Machine Co., 24 York St., New Haven, Conn., manufacturers of adding machines, are considering an increase in their equipment so as to be able to produce a monthly output of 100 machines.

The U. S. Electrogalvanizig Co., No. 1 Park Ave., Brooklyn, N. Y., manufacture mechanical electroplating apparatus for every kind of work. They also carry on electrogalvanizing at their works and have made a special study of electrogalvanizing since its inception. They are prepared to equip plants complete for electrogalvanizing any kind of iron or steel work.

Maxwell Blake, U. S. Consul at Dunferline, Great Britain, reports that about 1,500 tons of acetone are annually consumed in that country and with a value of about $500,000. He says that practically all of it is imported from the United States. It is used in making smokeless powder, dissolving gun cotton, and in the manufacture of chloroform, photographic plates, and in dyeing.

The American Blower Company of Detroit, Mich., and Sirocco Engineering Co., of New York City have consolidated, and the business will be carried on under the name of the American Blower Co. The main office will be in Detroit, but the factory of the Sirocco Engineering Company will be continued at Troy, N. Y., as heretofore. The manufacture of blowers of various types will be conducted as in the past.

The Standard Supply Company of New Haven, Conn., manufacturers of the celebrated "Platers-Compound" used so extensively in cleaning work for plating without tarnishing it, have brought out a new material called "Standard Burnishing Compound" for use in tumbling small metal work with steel balls. The rapidly increasing use of steel balls for polishing small work by tumbling has brought about a demand for a soap compound for use in this work. Ordinary soap not only tarnishes the work but attacks the steel balls and ruins them. The "Standard Compound" may be used in hot or cold water and produces a high polish on the metal goods. Samples will be sent to those interested.

The Fay Welding & Mfg. Co., has been organized at 696 East First St., South Boston, Mass., to carry on welding by the oxy-acetylene process. The Davis Bournonville method will be used and cast iron, steel, brass and aluminum will be welded for the trade.

The Lunkenheimer Company of Cincinnati, Ohio, manufacturers of steam metal goods, recently received an order for 7,000 valves from the Isthmian Canal Commission. The valves are to stand 200 lbs. per sq. in., working pressure.

C. G. Hussey & Co., of Pittsburg, Pa., proprietors of the Pittsburgh Copper and Brass Rolling Mills, are sending a handsomely embossed ornament to the trade to be used for reminding the buyer that they should not be overlooked in making inquiries or purchases.

The Goldschmidt Detinning Co., recently incorporated with a capital stock of $3,000,000 for the purpose of reclaiming the tin from tin plate scrap, old tin cans, etc., are to build works at Carteret, N. J. The office is at 60 Wall St., New York City.

John C. Wiarda & Co., Green & Provost Sts. Brooklyn, N. Y. are headquarters for nickel anodes and nickel salts. They also manufacture all kinds of chemicals for electroplaters, and make a specialty of carbonate of copper, carbonate of zinc, red copper compound and sulphate of zinc for electrogalvanizing (free from iron).

The Bridgeport Silverware Mfg. Co., of Bridgeport, Conn., manufacturers of coffin hardware, have moved into their new brick factory on State St. Extension, where the best of facilities are had for the manufacture of their goods. This factory is modern in every respect and some new plating equipment will probably be added later.

The new addition to the plant of the Carborundum Co., at Niagara Falls, N. Y., will be devoted to the mixing and molding of carborundum wheels and the manufacture of hones, sharpening-stones, etc. This company has recently added the manufacture of carborundum cloth and paper to its line of goods. Carborundum is the hardest abrasive known and ranks next to the diamond in this respect.

A fifth new annealing furnace has been added to the plant of the Ellwood Ivins Tube Works, Oak Lane Station, Philadelphia, Pa. This furnace is 24 feet long, 6 feet wide and 8 feet high. This company now draw steel tubes as large as 2 inches in diameter and shortly expect to be equipped to make them as large as five inches in diameter. Their range of sizes are interesting as they make tubing as small as a needle and which is used in hypodermic syringes. They are also the only maker of high carbon steel tubing that will stand tempering. Business is excellent with them and they are fully eight weeks behind in their orders. It may be of interest to the trade to know that they are the oldest tube mill in America.

The Valk Mfg. Co., has been organized at Topeka, Kansas, to manufacture pumps and hardware. The capital stock is $150,000, and a factory is being fitted up on Jefferson St.

The Brass Foundry & Heating Co., of Peoria, Ill., have disposed of their plumbing business, and are carrying a line of gas engines and automobiles.

The Union Metallic Catridge Co., of Bridgeport, Conn., manufacturers of ammunition, are to erect a shot tower for the manufacture of their own lead shot. Heretofore they have purchased the shot from outside parties.

The Regal Jewelry Mfg. Co., has been started at West Somerville, Mass., to manufacture jewelry. They have purchased the factory at 30 Newberry St., formerly occupied by the American Coil Co. Peter Provonost is the plater for the new concern.

The A. P. Smith Company of Newark, N. J., are soon to begin work upon their new plant at East Orange, N. J., adpoining the plant of the Sprague Electric Co. Valves and water works supplies will be manufactured, and a foundry will be erected.

F. C. Ohlmacher has started a factory in the Waterman Bldg., on State St., Lockport, Ill., to manufacture electroplated roses for use as hat pins. It is stated that he has a large order from Marshall Field & Co., of Chicago, Ill., for the goods.

The E. H. Mumford Company of Philadelphia, Pa., the well known manufacturers of molding machines, have completed a plant at 1223-1225 Spring St., for demonstrating their goods. This plant enables them to exhibit their machines to the best possible advantage.

The Georgian Mfg. Co., of Binghamton, N. Y., one of the recently organized companies for the manufacture of plumbers' brass goods, have equipped their brass foundry with Steele-Harvey Crucible Furnaces made by the Monarch Engineering & Mfg. Co., of Baltimore, Md.

The L. A. Littlefield Silver Co., of New Bedford, Mass., who manufacture silver plated hollow-ware, and employ about twenty-five hands, have consolidated with the Rockford Silver Plate Co., of Rockford, Ill., and will move there. L. A. Littlefield will become general superintendent of the consolidated companies.

The Plastic Bronze patent of the Ajax Metal Co. of Philadelphia, Pa., which has been the subject of much litigation has now finally resulted in a victory for them. They originally brought suit against the Brady Brass Co. of Jersey City, N. J. for infringement and won the suit, but upon an appeal by the defendant, the higher court reversed the decision. In view of the finding of the Court of Appeals, which held that the original patent covered the product and not the process, a reissue patent has been granted The Ajax Metal Co. which gives them the mixture containing over 20 per cent of lead and not less than 7 per cent of tin.

Personal.

J. R. Owen has resigned his position as secretary of the Michigan Copper and Brass Company of Detroit, Mich.

Albert A. Moers, 24-26 Stone St., New York City, metal exporter and importer, has returned from his extensive trip abroad.

R. A. Wood, formerly assistant superintendent of the Seymour Mfg. Co., Seymour, Conn., is now superintendent of the rolling mill of the Plume & Atwood Mfg. Co, Thomaston, Conn.

C. F. MacGill, has resigned his position as superintendent of the New York Air Brake Co., Waterbury, N. Y., and has accepted the position as factory manager of the Lyon Metallic Mfg. Co., of Aurora, N. Y.

Arthur W. L'Hommedieu of Chas. F. L'Hommedieu & Sons Co., 99 South Clinton St., Chicago, Ill., the well known manufacturers of plating supplies, has been calling on the Eastern trade in reference to the new electroplating barrel which this company manufactures. He reports that it has met with the approval of the trade.

Obituary.

The death of Sir Philip Albert Muntz, Bart. M. P. took place on Dec. 21st, 1908 at his residence near Rugby, England. He was born in Umberslade, near Birmingham, England in 1839 and was for years chairman of the Muntz Metal Co., Ltd. His father was the late G. F. Muntz, M. P., the inventor of "Muntz Metal."

The recent death of Edward A. Barnard of New Britain, Conn. at the age of 62 years, removes a man of exceptional ability from the plating trade. At the time of his death he was in charge of the plating departments of the Russell & Erwin Co., of New Britain, Conn. and was considered a leader in his line. For the past few years he had made a special study of hardware finishes, and some of his products were revelations to the trade. He learned his trade at the works of the Meriden Britannia Co., of Meriden, Conn., and afterwards had a varied experience in some of the leading establishments in the United States. For years he was plater for the Ansonia Brass & Copper Co., when they manufactured lamps and chandeliers. Mr. Barnard was extensively known in the trade, and was considered an authority on the finishes which are used in the manufacture of builders' hardware. He leaves a widow and two sons, one of whom is connected with the plating department of the Russell & Erwin Co. and the other has charge of the plating department of the Rogers Silver Plate Co. of Danbury, Conn.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Acetone, pure, 98-99%	℔	.22
Acid, Acetic, pure, 30%	℔.	.07
Acid, Arsenious (White Arsenic)	℔.	.20
Acid, Benzoic	℔.	.55
Acid, Boracic (Boric), pure	℔.	.12
Acid, Hydrochloric, see Acid, Muriatic		
Acid, Hydrofluoric, 30%	℔.	.04
Acid, Hydrofluoric, 50%	℔.	.10
Acid, Muriatic, 20	℔.	.02
Acid, Muriatic, c.p., 20	℔.	.07
Acid, Nitric, 38	℔.	.05⅝
Acid, Nitric, 40	℔.	.05⅞
Acid, Nitric, 42°	℔.	.06¼
Acid, Nitric, c.p.	℔.	.08
Acid, Sulphuric, 66°	℔.	.01¾
Acid, Sulphuric, c.p.	℔.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	℔.	.04
Aluminum, Sulphate	℔.	.06
Aluminum, Metallic, in ingots	℔.	.24
Aqua Fortis, see Acid, Nitric		
Ammonia Water (Aqua Ammonia), 20	℔.	.01¾
Ammonia Water (Aqua-Ammonia), 26	℔.	.06¼
Ammonia Water, c.p.	℔.	.08
Ammonium Carbonate, lump	℔.	.15
Ammonium Chloride (Sal Ammoniac)	℔.	.12
Ammonium Hydrosulphuret	℔	.30
Ammonium Sulphate	℔.	.07
Ammonium Suphocyanate	℔.	.50
Amyl Acetate	gal.	1.85
Antimony	℔.	.08
Antimony Chloride (Butter of Antimony)	℔.	.23
Arsenic, Metallic	℔.	.15
Arsenic, White (Acid Arsenious)	℔.	.20
Argols, White (Cream of Tartar)	℔.	.31
Asphaltum, Commercial	℔.	.05
Asphaltum, Egyptian (Bitumen)	℔.	.30
Benzine	gal.	.20
Benzol, Pure	gal.	.75
Bismuth, Metallic	℔.	1.75
Bitumen, see Asphaltum.		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	℔.	.10
Borax Glass	℔.	.35
Cadmium, Metallic	℔	.75
Carbon Bisulphide	℔.	.10
Calcium Carbonate (Precipitated Chalk)	℔.	.10
Chrome Green	℔.	.50
Copper, Lake (carload)	℔	.14
Copper, Lake (cask)	℔	.14½
Copper, Electrolytic (carload)	℔.	.13½
Copper, Electrolytic (cask)	℔.	.14
Copper, **Castings (carload)**	℔.	.13
Copper Castings (cask)	℔.	.13½
Copper Acetate (Verdigris)	℔.	.35
Copper Carbonate, dry	℔.	.25
Copper Sulphate (Blue Stone)	℔.	.09
Copperas, see Iron Sulphate.		
Corrosive Sublimate, see Mercury Bichloride.		
Cream Tartar, see Potassium Bitartarate.		
Cryolite	℔.	.12
Cyanide, see Potassium Cyanide.		
Dextrin	℔.	.15
Emery Flour	℔.	.04
Emery, F F & F F F	℔.	.03
Flint, powdered	℔.	.01
Fluor Spar	℔.	.01¼
Fusel Oil	gal.	1.75
Gelatine, Nelson's	℔.	1.15
Gold Chloride	dwt.	.80
Gum Copal	℔.	.30
Gum Damar	℔.	.30
Gum Elemi	℔.	[illegible]
Gum Guaiacum	℔.	.25
Gum Mastic	℔.	.50
Gum Sandarac	℔.	.35
Gum Shellac, brown	℔.	.50
Gum Shellac, white	℔.	.60
Iron Perchloride	℔.	.25
Iron Sulphate (Copperas)	℔.	.05
Lead Acetate (Sugar of Lead)	℔.	.15
Lead, Pig	℔.	.04½
Lead, Red	lb.	.12
Lead, Yellow Oxide (Litharge)	℔.	.12
Liver of Sulphur, see Potassium Sulphide.		
Manganese, Ferro, 80%	℔.	.10
Manganese, Metallic, pure	℔.	.75
Magnesium, Metallic	℔.	1.50
Mercury Bichloride (Corrosive Sublimate)	℔.	.93
Mercury, Metallic (Quick Silver)	℔.	.89
Mercury Nitrate	℔.	1.50
Mercury Oxide, yellow	℔.	1.80
Nickel and Ammonium Sulphate (Double Salts)	℔.	.16
Nickel Carbonate, dry	℔.	.60
Nickel Chloride	℔.	.50
Nickel, Metallic	℔.	.47
Nickel Sulphate (Single Salts)	℔.	.25
Nitre (Saltpetre), see Potassium Nitrate.		
Oil, Palm	℔.	.08
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	℔.	.15
Pearlash, see Potassium Carbonate.		
Phosphorus, yellow	℔.	.40
Phosphorus, red	℔.	1.10
Pitch	℔.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	12.50
Platinum, Metallic	oz.	23.50
Potash by Alcohol, in sticks	℔.	.50
Potash, Caustic (Potassium Hydrate)	℔.	.08
Potassium Bichromate	℔.	.14
Potassium Bitartarate (Cream of		
Potassium Carbonate (Pearlash)	℔.	.10
Potassium Chlorate	℔.	.15
Potassium Cyanide	℔.	.25
Potassium Iodide	℔.	2.25
Potassium Nitrate (Nitre or Saltpetre)	℔.	.10
Potassium Permanganate	℔.	.17
Potassium, Red Prussiate	℔.	.60
Potassium, Yellow Prussiate	℔.	.24
Potassium Sulphide (Liver of Sulphur)	℔.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	℔.	.70
Tartar)	℔.	.31
Pumice, Ground	℔.	.05
Quartz, Powdered	℔.	.01
Rosin, Yellow	℔.	.04
Sal-Ammoniac, see Ammonium Chloride.		
Sal-Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver	oz	.52
Silver Nitrate, crystals	oz.	.50
Soda-Ash	℔.	.05
Silver, Fine	oz.	.50⅝
Sodium Biborate, see Borax.		
Sodium Bisulphite	℔.	.15
Sodium Carbonate (Sal-Soda), crystals	℔.	.02
Sodium Hydrate (Caustic Soda)	℔.	.05
Sodium Hydrate (Caustic Soda) by Alcohol (in sticks)	℔.	.45
Sodium Hyposulphite ("Hypo")	℔.	.04
Sodium, Metallic	℔.	.90
Sodium Nitrate	℔.	.05
Sodium Phosphate	℔.	.09
Sodium Silicate (Water-Glass)	℔.	.04
Soot, Calcined	℔.	.15
Spelter, see Zinc.		
Spermacetti	℔.	.40
Sugar of Lead, see Lead Acetate.		
Sulphur (Brimstone), in lump	℔.	.05
Tin Chloride	℔.	.45
Tin, Metallic	℔	.27½
Turpentine, Venice	℔.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water-Glass, see Sodium Silicate.		
Wax, Beeswax, yellow	℔	.45
Wax, Carnauba	℔.	.70
Wax Japan	℔.	.20
Whiting (Ground Chalk)	℔.	.02
Zinc Carbonate, dry	℔.	.19
Zinc Chloride	℔.	.12
Zinc Sulphate	℔.	.06
Zinc (spelter)	℔	.05⅛

THE BRASS WORLD AND PLATERS' GUIDE

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The Detinning Question.

Much attention is now being paid to the removal of tin from tin plate scrap, and new processes for doing it are frequently making their appearance. At the present time, in spite of the large number of processes that have been patented or proposed, the successful detinning of tinplate scrap is limited to a few concerns.

The whole question seems to resolve itself into one of a supply of raw material. The concerns which are now successfully detinning the scrap are connected with the largest users of tin plate, and are, accordingly able to obtain a constant and suitable supply of the scrap for their needs. Scrap of this nature which consists of clippings from new tin plate is the most satisfactory material for treatment. It is clean, and exposes a large surface to the action of the materials used for stripping the tin. The detinning of this class of scrap has become a commercial success, but unless affiliated with some large user of tin plate, it would be quite difficult for the inventor of a detinning process to obtain a sufficient supply of scrap for carrying on his business.

The other source of supply of tin plate scrap is in old tin cans. While no argument is needed to indicate the magnitude of the supply of this material, it is of quite an unsatisfactory kind. Always filled with dirt it requires cleaning before stripping, and this often costs too much for the profitable working of the detinning business. In addition to this fact, the cost of collecting the tin cans is greatly against their use. They are light and will not allow transportation to any considerable distance. Unless the cans could be treated locally, it would seem that their use for detinning is not as an attractive proposition as it would at first seem.

Use of a Flux in Welding Aluminum Oxy-Acetylene.

In welding aluminum by means of the oxy-acetylene blowpipe, the operation is simply one of melting the joint together. The intense heat of the blowpipe allows it to be done with great rapidity so that the whole casting it not affected. The process is analagous to that of lead-burning.

As the aluminum is melted by the oxy-acetylene blowpipe when the welding is done, the use of the flux it as essential as it is in melting the metal for casting into molds. Heretofore, it has not been used and the welds have not shown the strength they should. The employment of a flux, however, has given excellent results and the strength of the welded joint was increased over fifty per cent., by the use of common-salt on the joint while the welding was going on. It is quite probable that chloride of zinc, or other low melting flux would give even better results.

Cores for Aluminum Castings.

Cores for aluminum castings should be made with the intention of using them for aluminum, if the best results are to be obtained, and not for general work. A core which will give good results in making iron castings may not answer at all in casting aluminum.

As aluminum does not "burn" the sand at all, it is useless and also objectionable to blacken the surface of a core to be used in making an aluminum casting. In the first place, it does no good at all and the labor spent in doing it is wasted. In the second place, the blacking stops up the pores of the core on the surface (and this is where it should be the most open) and prevents the escape of the gases when the aluminum strikes it. The result is a "blow." By not blacking a core, the sand is left as open as possible.

Unless required for the sake of appearance, too fine sand should not be used in making cores for this work. Coarse sand always gives a more open core than that which is fine.

The binder is important and molasses water seems to be a favorite with aluminum founders as it serves to hold the core together and makes but little gas when the aluminum strikes it. Glue is also an excellent material. Whatever binder is used, however, must be such as to leave the core soft. One that can be roughly handled will not do and castings that are made from it will usually crack. A core that requires delicate handling in order to prevent breakage can always be relied upon and in practically all cases will produce good aluminum castings.

Taking "Fire" Out of Sterling-Silver.

As "fire" in sterling-silver is caused by the formation of the sub-oxide of copper on the surface and which penetrates to a greater or less depth, the best method of taking it out is to prevent its formation. After it is once in the silver it can only be removed by polishing, grinding, pickling dipping or otherwise removing the layer or skin of metal on the surface. This procedure, of course, is very expensive althought extensively done.

To prevent the formation of "fire" in sterling-silver, it is only necessary to keep it away from the air while being annealed. If it is enclosed in a tight can or retort, if annealed in a neutral or reducing atmosphere such as carbonic acid gas, nitrogen, hydrogen or steam, if coated with any substance like borax, boracic acid, whiting, clay or other inert materials, which prevent access to the air, the silver will contain no fire.

The tendency in the sterling-silver trade is to produce stock that is fireless rather than to remove it after the article has been annealed for the last time. In some instances it is more costly to do it in this manner and the old method is carried out, but there are many articles now made of sterling-silver which can be manufactured of fireless stock with good results. It should be borne in mind, however, that even though fireless sterling may be produced by a manufacturer of sterling-silver sheet, if it is annealed at any time, "fire" is again introduced and the work of rendering it fireless wasted. Only in operations in which no annealing is done can fireless sterling-silver be of value.

The Manufacture of Steel-Balls for Tumbling Purposes.

The use of steel balls for producing a high polish on metal goods, both bare and plated, during the tumbling operation has now become firmly rooted so that it may really be called a standard method for certain classes of work. In many establishments large quantities of goods are daily turned out with a surface almost equal to that produced by buffing and which is produced by the use of suitable steel balls in tumbling. No other polishing operation is done upon them.

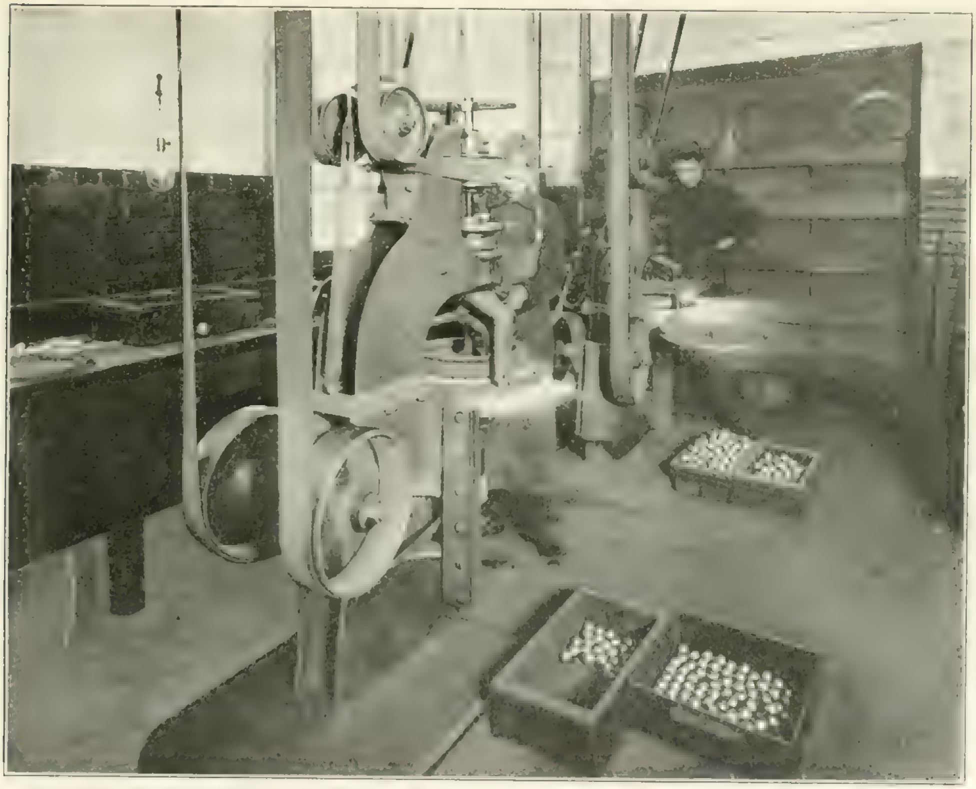


Fig. 1. Machines and Method of Grinding Large Steel Balls at Works of the Standard Roller Bearing Company, Philadelphia, Pa.

The manufacturing jeweler was the first to appreciate the value of steel balls in tumbling and he was accustomed to use them in polishing such small work as collar-buttons,, chains, pins, rings and many other classes of material upon which actual hand buffing would be out of the question. By the use of steel balls, however, he soon found that for all practical purposes equally as good a surface could be produced on the goods by careful tumbling as hand buffing would turn out, and at a very much less cost. Steel balls, therefore, have come to stay in the manufacture of cheap jewelry and there are few establishments that make this class of goods which do not use steel balls for polishing more or less of their work.

The manufacture of other metal goods, such as buckles, clasps, eyelets, hooks, ferrules and similar classes of work took up the steel ball problem after it had been worked out in the manufacturing jewelry trade, but they found it equally well adapted for their work. Large quantities of steel balls are used in the metal trades for this purpose and the future will unquestionably find still more employed. The great saving in labor is the attractive feature.

In the manufacture of steel balls, as well as the bearings and accessories, the Standard Roller Bearing Co., 50th St., and Lancaster Ave., Philadelphia, Pa., are one of the largest in existence. Their works consist of thirteen different departments with a total length of buildings of over half a mile, and 500,000 square feet of factory surface. Their trade is of a varying character as they supply steam ship thrust bearings and also the smallest steel balls for the smallest kind of work. In addition to the manufacture of the balls and bearings, they also manufacture automobile parts in which the bearings and balls are used.

A brass and steel foundry is another feature of the plant. The interior of the brass foundry is herewith illustrated. It is used for making the various castings needed for special bearings and other similar work. Brass and bronze balls are also used to a considerable extent in valves and other special articles, and these are also made in the brass foundry. The size of this foundry indicates that considerable work is done in the brass line by this company.

Two kinds of steel balls are made by the Standard Roller Bearing Company. The first is called "Standard Alloy" and is a special steel that has been found to give the best results for work requiring severe service. These balls have from 25 to 50 per cent greater crushing strength than other balls. They are quite suitable for automobile and similar high-pressure work, and are no better for tumbling than the other grade subsequently mentioned.

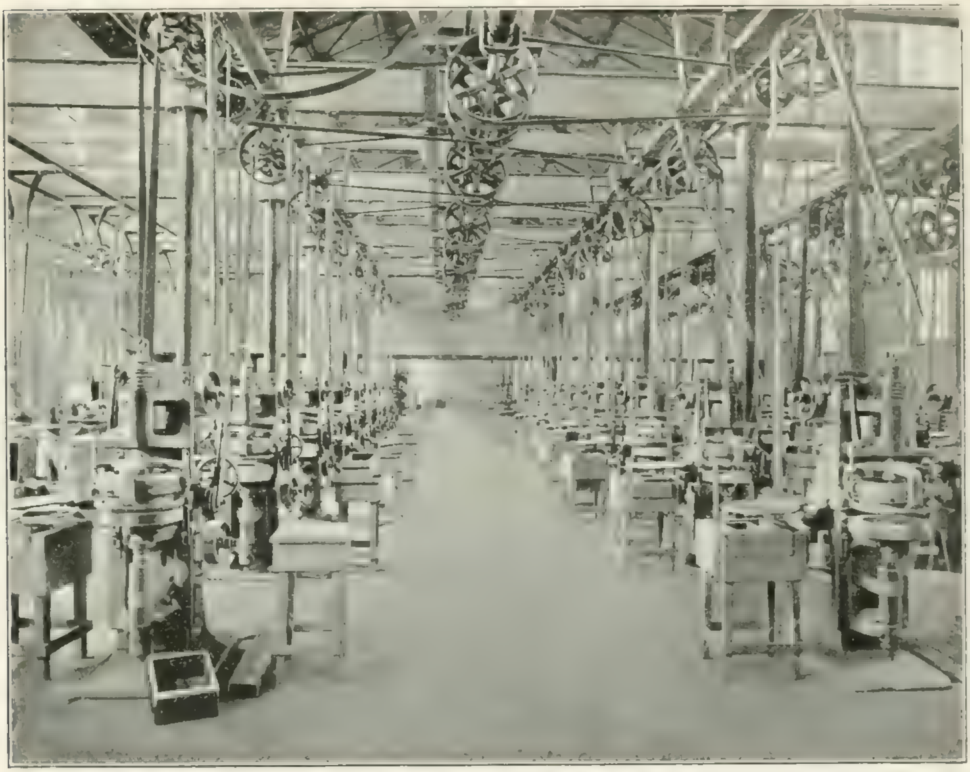


Fig. 2. General View of Ball Grinding Room Showing Machines for Grinding Steel Balls.

A complete chemical laboratory is one of the departments of this plant in which the steel is daily tested and analyzed to ascertain whether specifications are being filled. It is an excellent check on the raw material as well as the finished product and serves to insure the customer that he will obtain the best for his work.

The "High-Duty" ball is made of high-carbon crucible steel and is extensively used for the greater part of the ball bearings now in use. This steel is made into balls of any desired size and hardened clear through after which the balls are ground as shown in the illustrations. This grinding is done on machines specially constructed for the purpose and which are herewith illustrated.

When ground the balls are carefully tested and inspected and those which are defective or inaccurate are rejected. In the sorting which thus results, three grades are obtained:

Fig. 3. Brass and Steel Foundry at the Works of the Standard Roller Bearing Co., Philadelphia, Pa.

"A" or First Grade.—These are the highest grade tool-steel balls and are free from flaws of every kind. They are so accurately finished that they will not vary over 0.001 inch. The balls of this grade are suitable for all kinds of ball bearings.

"B" or Second Grade.—In the manufacture of the balls, there are always some that are not as accurate in diameter as others. They are also apt to contain slight, almost invisible imperfections. While such imperfections prevent their use in the highest class of work, they do not injure them for others. For this reason balls of this kind are sorted into this class. They are really "seconds." They may vary as much as 0.002 inch in diameter.

"C" or Third Grade.—This class is known as the "Hardware Grade" and are a low grade ball taken from the other higher grades. They are suitable for some classes of work or goods used in the hardware trade and in which accuracy of the highest character is not essential.

The balls used for tumbling with small metal goods need not be of the highest grade. As long as they are hard and smooth it matters not whether the diameter is uniform throughout. The second grade are equally as suitable as the "first" and are extensively used for the purpose. They are somewhat cheaper than the first grade. The hardware grade is usually too poor to use for tumbling as the imperfections in the surface abrade the polish on the work. In order to be of value for tumbling, a steel ball must be both hard and have a smooth, polished surface free from imperfections.

The Standard Roller Bearing Company is the largest maker of steel balls in the United States, and have a capacity of over 2,000,000 balls per day. The sizes range from those 1/32 inch in diameter up to 6 inches and of any metal desired.

In using steel balls for tumbling metal work, all that is necessary to do is to have a suitable tumbling barrel (a horizontal one is required) and to place the work to be tumbled in the barrel with a sufficient number of balls. The less balls there are, the longer the polishing will take, so that it is poor judgment to attempt to economize on balls. A quantity of a special soap compound, made particularly for tumbling by this method, is now placed in the barrel and the tumbling commenced. In a short time, the surface of the metal will be burnished by the balls. They act like an ordinary steel burnisher in this respect as nothing is taken off and a thin gold deposit may be as readily polished as a thick one. In the use of the balls, only a special burnishing soap should be used as common soaps attack the steel balls as well as the work itself and both are injured.

The Relative Deoxidizing Properties of Magnesium, Calcium and Aluminum.

The relative deoxidizing properties of magnesium, calcium and aluminum have been determined by F. E. Weston and H. R. Ellis (*Faraday Society*, Dec. 15, 1908). They found that aluminum oxide is reduced by magnesium and by calcium and that calcium oxide is reduced by magnesium. They draw the conclusion that the heat of combustion of magnesium is slightly greater than that of calcium, and that it is greater in the case of calcium than in aluminum.

The results, therefore, show that magnesium is a stronger deoxidizing agent than either calcium or aluminum, and that calcium is stronger than aluminum. This would seem to explain the fact that some aluminum founders claim that aluminum (particularly that made from scrap) is benefited by the addition of a small amount of magnesium. It is probable, if it is true, that the magnesium reduces the oxide of aluminum in the molten aluminum.

A New Alloy of Copper and Iron.

A new alloy containing copper, iron, nickel, lead and aluminum has been patented by Warren G. Black of St. Louis, Mo. (U. S. Patent 912,654, Feb. 16, 1909). It is claimed that the alloy is adapted for bearings, bushings and similar work. The proportions used are as follows:

Copper........................	50 lbs.
Iron........................	40 lbs.
Lead........................	6 lbs.
Nickel........................	4 lbs.
Aluminum........................	4 oz.

The manner of making the mixture, as given in the patent specifications, is as follows: The iron is melted first and then nickel added and the heat continued until both metals are melted and thoroughly mixed. The copper is next added and afterwards the aluminum. The lead is introduced last. The inventor says that the addition of the aluminum raises the temperature of the metal sufficiently high to insure the melting of all the iron and nickel. It is furthermore stated by the inventor that "An alloy of this description forms a very efficient bearing, for the nickel in the alloy is greasy and thus acts as a lubricant. The main object of incorporating lead into the alloy is to impart a certain degree of softness."

Owing to the fact that the vaporizing point of calcium is about 200 degrees below the melting point of iron, it has been found impossible to make alloys of iron and calcium except under pressure. Even the alloys formed under pressure are of no value on account of their instability. Alloys containing over 4 per cent calcium oxidize very rapidly upon exposure to the air.

In an experiment made on nickel steel containing 45 per cent of carbon and a large number of blowholes, a French investigator has found that the gases contained in the blowholes consisted of carbon dioxide, carbon monoxide, hydrogen and nitrogen. A volume of gas ten times that of nickel steel was obtained. The proportion of nitrogen gas was small, and while the carbon dioxide came off from the steel when heated (in vacuum) to about 520 degrees C., the nitrogen required a higher temperature.

Use of Potash Instead of Ammonia in Brass Solutions.

By Alfred Martin.

A few remarks in regard to the presence of free cyanide in brass solutions may be of interest to the electroplating trade, as no subject is worthy of more study and is as little understood as this one. It is well known that the less free cyanide there is in a brass or copper solution, the more rapidly the metal will deposit, and in addition the chances of blistering are less. It is necessary, however, to have a certain amount of free cyanide present in order to keep the anodes clean; otherwise, they would become coated over with a green slime that would finally prevent the passage of the current and the deposition of the current and the deposition of the metal would cease.

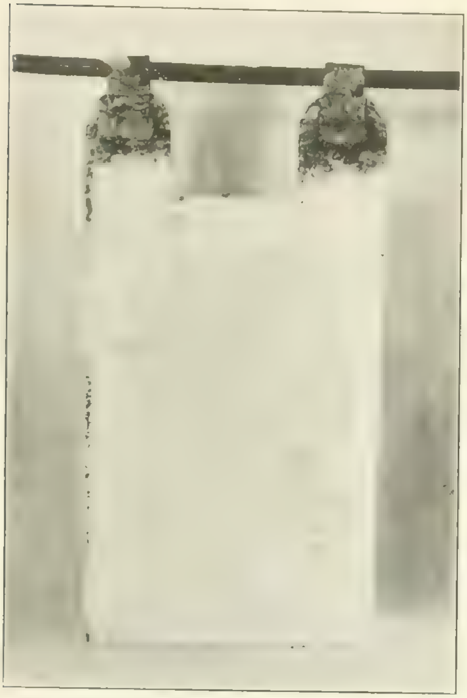


Fig. 1. Brass Anode Coated with White Deposit.

In a brass solution which contains a sufficient quantity of free cyanide to keep the anodes free from green slime it usually happens that after it has been run for some time, oftentimes for a month only and again for a year, the anodes will become coated over with a light, white film. The first thing a plater usually does in a case of this kind, is to take out the anodes and run them through a bright dip to clean the surface. While this does suffice to clean them, the white coating again makes its appearance, and then the plater usually believes that too little free cyanide is present and consequently adds more.

When the addition of free cyanide has been made, the color of the brass solution will frequently change and to overcome this color change some carbonate of copper or carbonate of zinc dissolved in cyanide may be added and while the color may be all right for the time being, the plater is usually surprised to find that, in coming to the close of the morning, the color of the deposit has again changed. The whole trouble lies directly in the fact that too much free cyanide is present in the brass solution, and it has been brought about by the [illegible]

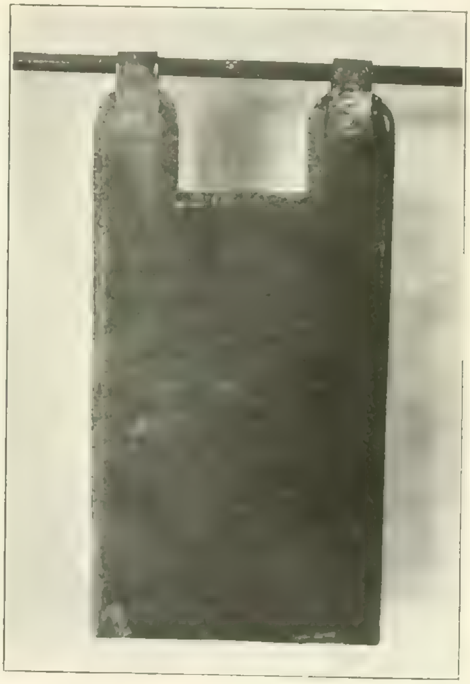


Fig. 2. Brass Anode Cleared from White Deposit by Potash.

additional quantity to keep the white coating from forming on the anodes.

The best way to prevent the formation of the white coating on the anodes in a brass solution, and at the same time avoid the presence of an excess of free cyanide in it, is *to add about ½ oz. of caustic* potash in sticks to each gallon. When the anodes begin to coat, the potash is introduced. As potash dissolves easily, a small quantity of the solution is taken out and the right amount of the stick potash is added to it and allowed to dissolve. It is then added to the brass solution and the whole stirred so as to thoroughly mix. The white coating on the anodes will almost immediately disappear, and at the same time the brass deposit will become brighter. The addition of the potash is also very useful in obtaining a gold color from a brass solution, but the amount of copper must then be in excess.

In the use of ammonia in a brass solution it is frequently noticed that the brass deposit will not be uniform in color, but will be zinc on one portion and copper on another. When potash is used in the brass solution, this does not occur. It is necessary, however, to use pure potash for this purpose, and the white, stick potash of commerce is the best. With the use of the potash, no ammonia at all is required and while in charge of the plating department of the New Jersey Lamp & Bronze Works at New Brunswick, N. J., I had over 3,000 gallons of brass solution in use for nearly eight years which did not have a drop of ammonia added to it.

Two New Core-Compounds.

Two new core compounds have recently been patented in the United States. These compounds are herewith described.

One, issued in the name of Ernest E. Howe of Battle Creek, Mich. (U. S. Patent, [illegible], Feb. 9, 1909), consists of 8 lbs. of common salt, 1 lb. of asphalt and 1 lb. of sea-coal (soft coal). The three ingredients are ground together so as to form a powder, which is then mixed with the core sand in the usual manner. By its use, the inventor says linseed oil, flour or rosin are dispensed with.

The patent issued in the name of William [illegible] of Wilkinsburg, Pa. (U. S. Patent [illegible], Feb. 9, 1909), claims the use of ground corn-cob in place of flour. The ground corn-cob material, however, is mixed with the same weight of ordinary flour in order to obtain the necessary binding qualities. The advantage obtained by the use of the ground corn-cob is the porosity which it imparts to the core and thus allows free escape of the gases. It is also said that a core made in this manner resists the washing action of the molten metal better than one made with ordinary flour. The fumes given off from a core containing corn-cob are not as objectionable as those arising from wheat or rye flour. The cheapness of corn-cobs, the inventor claims, is such that a corn flour made from it can compete with the cheapest material known.

Determining the Amount of Tin on Tin-Plate.

It frequently happens that the amount of tin on tin plate is desired. K. Meyer in *Zeit. Angew. Chem.* gives a method for performing the operation which neither requires much skill nor time.

The tin plate is cut up into small pieces and weighed. From 20 to 50 grams are weighed out and placed in a porcelain dish. Water is now added until the cuttings have been covered. The whole is now warmed to about 80 degrees C. and about 2 grams of sodium peroxide added. When the vigorous action has subsided, about 1 gram more of the sodium peroxide is introduced. The mixture is now boiled and the cuttings examined to ascertain whether all of the tin has been stripped off. If not, then more sodium peroxide is introduced and the heating continued.

The iron (or steel) from which the tin has thus been dissolved is washed with water, then with alcohol (so as to allow rapid drying) and dried. It is then weighed. The difference between the first and final weights gives the amount of tin. If any lead is present in the tin, it is also dissolved so that in terne plate or also that which contains a small quantity of lead, the loss of weight is not necessarily tin but the total coating. The method suffices, however, for determining the coating on the tin plate.

Carborundum, now so extensively used for an abrasive, is composed of silicon and carbon. Chemically it is silicon carbide.

Utilization of Wastes from White Metals, Reclaiming of Drosses and Recovering Tin and Zinc from Tinned and Galvanized Iron.[*]

It is now more than forty years since I first seriously considered that in the use of what were then called "Waste-Products" from metallurgical operations there was a field almost untouched, and treating the subject I shall confine myself chiefly to an account of my own work in this line.

The white metals to which I refer are silver, tin, zinc, antimony, bismuth, lead, mercury and their various alloys, and my paper will treat of the methods which I have found most serviceable in utilizing the waste products resulting from the use of the metals either singly or as alloys. In reference to the utilization of silver wastes, the subject is so well known that I will refer to this only in connection with the recovery of silver from plated-ware in another part of my paper. First in order, I will relate my experience in connection with

Utilization of Tin Clippings and Galvanized Iron Scrap.

When first I turned my attention to the subject, I found that large quantities of tinned scrap and galvanized iron were every day carted to the dump. I found that the average coating on scrap tin, as tin on tinned plate, was 3 per cent.; that the iron if properly cleaned, could be used in the nobbling furnace and in the puddling furnace; that the use of galvanized iron was a necessary part of the process and looked so encouraging that we decided to build a plant to work it on a commercial scale.

I procured a half-dozen of the lager-beer casks used for storage and which are about 6 feet in diameter and 6 feet deep. After removing the heads, they were placed in the ground in a semi-circle and a crane was rigged up that commanded all the tanks. In the first tank, was charged hydrochloric acid (muriatic acid): in the second, water, in the third, water with a little lime; in the fourth, water; and in the fifth, a solution of copper sulphate.

The plan of work was to fill a large wooden cage that would hold loosely about 200 lbs. of the clippings. This was swung on the crane and placed in No. 1 tank. In ten minutes time the cage was raised and the clippings examined to see if the tin was dissolved. If so, the cage was then lifted out of the acid tank and another cage filled with clippings took its place. The clean scrap was washed in the water tank No. 2 lifted up and down to well wash it, and then immersed in the lime tank No. 3. This neutralized all the residual acid that was left in the pores of the iron. The untinned and limed scrap was then removed to water tank No. 4 for a final washing, then plunged for a moment, just enough to submerge it, in the copper sulphate solution, then immediately removed. The object of this treatment was to form an exceedingly thin film on the iron to prevent the rusting of the clean iron, which is so sensitive when exposed to the air that it will almost instantly cover itself with rust. The clean scrap was compressed in a drop press into balls, and in this form was shipped to the iron works and worked into blooms for sheets, commanding a price of from $10.00 to $12.00 per ton.

After the process had been continued for some time, all the acid in No. 1 tank would become neutralized and we would have a solution of chloride of tin. The process of tin cleaning stopped here for awhile. We then took a cage of galvanized iron scrap, filling the cage loosely. When the zinc came in contact with the tin solution, the metallic zinc took the place of the tin, forming zinc chloride, and all the tin was precipitated as metallic tin in a finely divided state. We worked this plant successfully for some time, recovering, when melted into ingots, about 600 lbs. of tin from 10 tons of scrap. The recovered iron commanded $10.00 per ton.

This article is the complete paper read by the late Joseph Richards before the Mining and Metallurgical Section of the Franklin Institute of Philadelphia, Pa. While it was read in 1901, we have so many inquiries about the processes contained therein, that it is considered advisable to reprint the whole article verbatim. It is the only extensive treatise ever written on the subject, and the author was an authority on the smelting and refining of white metal drosses.

and the zinc chloride [illegible] per barrel, for disinfectant purposes and treating wood for making it fireproof.

We finally closed the works because of the objectionable vapors that annoyed our neighbors, with the intention of rebuilding on the swamp near Chester, Pa., but other things prevented us from doing so. I yet think it is the best and most profitable means of utilizing this scrap, especially if electricity is used for the disposition of the tin.

Wastes from the Galvanizing Process

While working up the tin scrap, I turned my attention also to the wastes from the galvanizing process. In order that the problems involved may be understood, I will give a brief description of the process as then and now practiced.

The trade term "galvanizing" relates to the coating of iron with zinc. In order to do this the iron article to be coated must first be surface-cleaned from all dirt and other impurities, so as to present a perfectly clean metallic surface. If any dirt, scale or oxide remains on the surface, the zinc will not adhere to that part and imperfect work will result. This cleaning is done by immersing the article in a bath of sulphuric acid and water, well washing in water, plunging in hydrochloric acid for a short time and drying. The article is then put into the bath of molten zinc. If sheets, or similar articles that will not hold much water, are being coated, the drying may be dispensed with to advantage. The galvanizing tank, or bath as it is called, is of necessary size for the articles to be submerged, varying from half a ton to thirty tons capacity.

This tank is usually oblong in shape and is divided on its surface by a longitudinal partition into two parts. On one side of the division a suitable flux is placed which will dissolve the oxide of zinc on the surface or prevent its formation. The flux used is ammonium chloride or in trade parlance sal-ammoniac. The other side of the bath is kept clean by continually skimming off the oxide of zinc as fast as it forms. In this skimming of the pot considerable clear metal is unavoidably removed with the oxide.

The side with the sal-ammoniac soon becomes covered with a thick "blanket" or scum which consists of the dissolved oxide which has partly been [illegible] with sal-ammoniac and formed a double chloride of zinc and ammonia.

The sal-ammoniac must be fed continually to the top of the pot so as to keep the surface of the molten zinc clean and free from oxide, or else the oxide will adhere to the iron surface and affect injuriously the finished product by leaving spots uncoated with zinc.

By the continued addition of sal-ammoniac the scum accumulates on the top of the pot and soon gets too thick for the workman to push his plates or other articles through, so a portion is removed from time to time. This yields on one side a waste called "sal-ammoniac skimmings" and on the other side zinc oxide or "zinc skimmings."

Yet another by-product is made that is called "zinc-slab dross." This is formed by the continued washing away of a portion of the iron that is being galvanized, for zinc in a molten state will alloy with iron, so that as soon as the iron becomes as hot as the bath, its surface begins to dissolve in the zinc. If from accident or design, a piece of iron is left in the bath, after this dissolving process it will in time be entirely dissolved. We often find bolts, nails, castings etc., from the bottom of the bath that are nearly all, as it were, eaten away or dissolved in the zinc.

This addition of iron to the bath forms an alloy of iron and zinc that is of greater specific gravity than the zinc itself and which falls to the bottom of the bath. If the bath is run "hot," it collects very fast, but under ordinary circumstances a bath of the usual size for pipes or sheets will make a ton of this dross in a week.

In order to have depth enough to do the work properly, the dross must be removed. This is usually done every Saturday afternoon. A large spoon is used perforated with holes to allow the zinc to drain out, and the semi-fluid dross is pasted into molds, smoothed off with a shovel, and is then the slab dross of commerce.

Thus it appears that we have three by-products: Sal-ammoniac skimmings from one side, the oxide of zinc skimmings from the other and slab-dross from the bottom of the bath.

Sal-ammoniac Skimmings

At the time I started, 1871, there was no [illegible] for sal-ammoniac skimming, and in all the works where I examined the [illegible] throwing it away. I commenced experiments to separate this waste into three parts, for I knew that the sal-ammoniac, if recovered, could be used again, also the metallic zinc, and I thought I could find a use for the zinc oxide if it could be freed from its impurities. Simple as this problem appears, it was not solved without much labor. I found by leaching these skimmings in hot water and steam that I got all the zinc chloride and sal-ammoniac in solution. This I evaporated down and recrystallized for use again on the bath. The residue, after washing with water and drying, I found to contain zinc oxide with some little dirt and shots of metallic zinc. I placed this in a tumbler or octagon-shaped barrel with the joints not very light. After revolving for some time, all the oxide lumps were ground to powder, and the metallic particles were nice and clean ready for melting on the top of a pot of molten zinc. The oxide in the shape it was, was worth $30 per ton to makers of white zinc paint.

I had to induce the paint men to buy this new product, but they were surprised on using it at its value to them and willingly gave us the above price. The average yield was:

Zinc	20%
Ammonium and zinc chloride	30%
Zinc oxide	35%
Iron scale and dirt	15%

I visited the galvanizing iron works, bought up what waste I could and contracted for future deliveries for one, two or three years in advance. At the McCollough Iron Co. Works in this city, we dug up a large part of their yard where the stuff had been thrown for filling and it realized about $300 a car-load. Also in Pittsburg, I found a dump where it had been thrown for years, and though it was badly mixed with dirt and ashes, I gave them $50 a car-load for all they could recover. At Winches' old iron mills in this city many of the yards had been cut up and the "salamanders" of dross had been used for filling up the Delaware River Wharves. All that was left, I purchased. The largest lump I ever handled [illegible] of good spelter.

[illegible]

crets. To-day the process is generally known in the trade and is practised by the largest zinc oxide makers in this country and in Europe.

Zinc Oxide Skimmings.

This, as previously mentioned, consists of zinc oxide and shot metal. I had no particular trouble with this waste. All that was needed was to place it in the tumbler or barrel before described and then melt the resulting shot metal in our furnace, pouring into suitable ingots for use again.

I found at Trenton one accumulation of several hundred tons of mixed skimmings that they had tried to roast for zinc white, but the sal-ammoniac and the zinc chloride rotted thousands of dollars' worth of flannel bags and the operation had to be abandoned. By my process it was all used up profitably.

The galvanizers now keep their skimmings separate, are very careful of them, and last year the price for this product was advanced from $15 to $30 per ton according to its quality.

Zinc Dross

We now come to the third and most important residue, the dross, [illegible] with iron. Here I would preface my remarks by saying that, as a pioneer in this industry, I had to gradually feel my way. All the work done was original with myself. I had no outside help from books, and from that day to this my work has been one long experiment. I feel that in the limits of this paper I can only just touch on the successful part of my work without recording the many failures.

At the time I began working in this line, the greater part of the slab zinc dross was sent to England. The only known way of using it to advantage was to distill it in retorts [illegible] The first experiments were directly in the line [illegible] from [illegible]

[illegible]

molten state. First, I took a crucible, and when the metal was melted, I injected cold air to oxidize the iron with the result of oxidizing the zinc, then hot air but with still quicker oxidizing of the zinc. Steam was a slight improvement; superheated steam was better; salts of the alkalies all acted on the zinc, but sulphur gave good results. I continued these experiments on a large scale, using large furnaces, so that I could treat several thousand pounds at a time.

Once I had a very interesting experience. Thinking that the zinc and iron alloy should be as hot as possible so that the sulphur would more rapidly attack the iron, the temperature of the metal was gradually raised, but too high, for as soon as the sulphur was immersed it fired the pot and immediately the center rose in the air to a height of several feet and lamps of molten zinc, all on fire, flew in a perfect shower. It was a little volcano threatening death and destruction to all around. My men ran away; I seized the fire hose and by sprinkling only on top succeeded in quenching the fire. It will suffice to add that the experiment was never repeated.

To sum up my results, I found that cyanides answered the purpose admirably, but the cost was prohibitory. Sulphur and superheated steam were both good. I built a plant to treat the dross on a large scale, and made a very simple furnace to superheat the steam and a tube for feeding the pot with chemicals. This furnace is the same as those now used except that they are now built much larger. So successful was the process that, to protect ourselves, we were obliged to patent it.

As before stated, I wanted to treat the molten metal with superheated steam and also wanted to use the cyanides and the sulphur. Accordingly I devised a method which readily overcame all the difficulties of their application. We all know that potatoes are composed largely of water and that leather scrap is used in making cyanide, so I used a mixture of sulphur, potatoes and leather scrap and introduced the mixture into the bath by means of an injector. This could be held under the molten metal and soon became hot enough to generate steam, distill sulphur, and throw off gases from the leather. The pot distills all it wants, the steam keeps the pot boiling, and about fifteen minutes cooks the pot of molten metal.

After the pot is boiled it is necessary to allow it to settle awhile, the oxides coming to the top and the new iron and zinc compounds going to the bottom. After it has properly settled, the good metal is bailed into molds and the residue is dug out with a shovel. The analysis of our refined spelter herewith given shows it to be nearly equal of the virgin spelter in quality.

"S" Spelter............	1.50%	Lead
American Western	1.50%	Lead
Average German..	1.00%	Lead
Silesian..................	2.10%	Lead
Blyberg.	1.75%	Lead

An analysis representing an average of over forty car loads of "S" spelter (this is the brand of spelter which Mr. Richards made from dross) gave the following results:

Zinc......	98.35%
Lead	1.50%
Iron	.15%

About this time I became acquainted with the late Col. Frishmuth and helped him in his experiments to make aluminum, and began experimenting to ascertain the effects of aluminum when alloyed with zinc. I found that the addition of 0.0001 per cent of aluminum to zinc was immediately and favorably shown, and it occurred to me that an alloy of zinc and aluminum might be used to advantage in the galvanizing pot, and as a finishing touch in our refining process. The results of these experiments were embodied in the patents for the use of aluminum in the refining of zinc, and in a patent for the use of aluminum in the galvanizing bath.

The action of the aluminum is, doubtless, to remove the oxygen contained in the molten metal, for which sufficient aluminum is added to make it fluid, and a sample is taken for analysis, no aluminum is found, but any addition after that point is reached is readily detected, and an excess is of no advantage to the metal. Though the quantity used is so small that no action could reasonably be expected, yet it is distributed so quickly all through the mass that in a few minutes, or from five to ten minutes we can commence pouring, while before we used the aluminum it required from half an hour to two hours for the proper settling to take place.

If a sample of untreated metal be taken from the bath, which will not run half way down the mold, it will, upon the addition to it of a little of the aluminum alloy in the ladle, become so liquid that it fills the mold and flows backward and forwards like water. In using the aluminum, I find it best to make an alloy of 98 per cent. zinc and 2 per cent. of aluminum, and for the galvanizing bath, 5 to 10 per cent of aluminum. So satisfactory have been these results and so commercially practical that we have treated about 100,000,000 lbs. of zinc dross by these processes. Even this result was not all that we could wish, and, from time to time, as they have suggested themselves, further experiments have been made with varied success.

We found a demand for a better grade of spelter, so we melted our "S" brand and subjected it to the same process a second time calling it "Double-Refined." The analysis shows from 99 to 99.75 per cent zinc, the only impurity being a little lead. It was thought that a chemically pure spelter could be made by again refining the "Double-Refined," but we were not successful in making it higher than 99.85 per cent. zinc. I then requested my son, Prof. Richards of Lehigh University, to give his attention to what could be done in the way of refining by electricity, and, after considerable work, we were encouraged to build a plant on a large scale to fully demonstrate its worth. We had a 40 horse-power engine and dynamo and succeeded in producing large quantities by this means. I believe it was the purest spelter ever made. The following analysis was made from a 2,000 sample by Prof. J. W. Richards:

Zinc	99.98%
Iron.	.007%
Aluminum . .	.002%

This electrolytic metal was absolutely free from arsenic and other impurities. Its manufacture was not profitable on account of the low market value of zinc.

The *scrap zinc* of commerce we melt in our pot furnace and treat in the same manner as the dross to remove its impurities. *Battery zincs* that contain mercury are put in the pot at night. A suitable cover is attached to the pot by means of which all the mercury is recovered without danger to the workmen.

(To be continued.)

The Economy of Skimming Brass into Water.

By A. L. Haasis.

The process of skimming brass direct from the crucible into water has now been made such an easy operation that its casting has been robbed of one of its most disagreeable features. Above all, however, is the great saving of metal. By the use of this method of skimming, from one-half to two pounds of clean metal are recovered from every pot skimmed and can immediately be utilized in the production of new and marketable castings.

The skimming tank, as supplied to the trade by The Metal Dross Economy Company of Bristol, Conn., consists of a cast-iron box 20 x 22 inches square, either 16 or 20 inches deep. It is covered with a steel top in which there is an opening about eight inches square in the shape of a funnel. Over this opening a top shield is placed standing at about 45 degrees. The object of this shield is to protect the caster from the heat, dirt and a great deal of the smoke which is so objectionable in skimming metal in the usual way.

The cast iron box is sunk into the casting room floor so that its top comes about two or three inches below the top of the crucible, and allows for the ashes that are left on the floor to support the pot. There should be ashes enough so that the crucible will stand alone. The tank is then filled with water within a couple of inches from the top or thereabouts.

The crucible filled with brass is now brought up to the tank and the dross skimmed directly into the water, and in the same manner as that followed with the old fashioned skimming heap. The skimming of the dross into water immediately stops the spelter smoke and does away with the skimming heap, thus leaving a nice, clean casting shop. As soon as the dross from the crucible strikes the water, all oxidation of metal ceases. In the old fashioned method, the brass continues to oxidize even after it has been skimmed and lies on the skimming heap. The oxide of zinc immediately separates from the metal as soon as the water is reached and the brass takes the form of pellets of varying size.

When the skimmings have been accumulated, the tank is ready to clean out at any convenient time. The skimmings and metal are shoveled out and washed through a tub [illegible] afterwards a 30 mesh riddle. The skimmings should not be allowed to dry, as the oxide of zinc will then adhere to particles of the brass and become much harder to clean off. The very fine shot metal, too, is then more difficult to save.

The skimmings, if desired, may be put into a barrel and kept wet and afterwards cleaned at any time. A barrel will hold the dross from 500 to 800 No. 30 crucibles if the same is run through a No. 8 riddle, and the large pieces taken out. The metal which passes through a No. 30 riddle either may be washed in a tub with a stream of water running through it, or the process may be continued with riddles as fine as desired. By doing so, the Metal Dross Economy Co. process will return the exact amount of metal that is skimmed from a pot. All that remains in the riddle is nice, clean and usable metal. The residue from this is, of course, more or less fine dust and oxide. It is barreled up and sold to refiners.

Fine Shot Metal Saved by Skimming Brass into Water.

In this process all the charcoal that remains unburned is saved and may be put back into the crucible again. There is no danger in the use of wet charcoal, and if anything, it is a little better if it is a little damp provided it is not pushed under the metal too rapidly. In a brass rolling mill or a brass foundry, where charcoal is used on the brass, it is a fair statement to make that fully one-third of the charcoal used in the first place is saved by this process. It is actually better when used a second time on account of the fact that it is finer and protects the metal from gases and sulphurous fumes from the coal in a more efficacious manner. It is well known that these gases and fumes are very injurious to melted brass.

It is no exaggeration to state that 60 per cent more skimmings can be saved with the Metal Dross Economy process than can be obtained by the use of a stamping mill or crushing barrel, as all of the smallest shot and thin pieces are ground up and lost, and 60 per cent more saved than in any other way where there is no crushing machine in use. For example, 60 lbs. of clean metal were taken that had gone through a No. 30 sieve, and were put in with the ashes as they came from the casting shop fires. The ashes were then ground in the ordinary way and including the metal that was in the ashes, let it be more or less, only 21½ lbs. of clean metal could be obtained. This was done simply to show that the amount of fine stuff that is ground into powdered dust, becomes lighter than the hard cinders and is then washed away by the water used in crushing.

There is no difficulty in using the metal obtained from the tank, however fine it may be, and it is so clean that there is no clogging up on the inside of the crucible when it is melted. Material so fine that it is almost invisible to the naked eye is saved and may be used over again.

In order to comply with the demands of large and small foundries, it has been found necessary to make the tanks in two sizes: The No. 1 size will hold the skimmings from fifty No. 25 crucibles, and the No. 2 size holds that of sixty No. 70 crucibles without the necessity for cleaning out. The water will remain at about the same depth in the tank no matter how much dross or charcoal may be skimmed into it. The oxides and fine charcoal take up water in about the proportion in which they fill the tank.

It is almost impossible either to state or have a person realize how closely the metal is saved from dross when this process is used. The only way to realize it is to dry the metal that has been recovered and then run it through a set of riddles as fine as desired. The value of the process and what it will do can then be fully appreciated. It is pleasing to note, that. although the process has been in use for over six months, and has been installed in many brass casting shops and foundries, there have been no complaints at all and it is thus apparent that satisfaction is being constantly obtained.

A New Method of Inlaying and Case-Hardening Metals.

A new method of inlaying metals has recently been patented by Sherard O. Cowper-Coles, the well known inventor of the galvanizing process known as "Sherardizing." The process (U. S. Patent, 911,116, Feb. 2, 1909) is as follows:

The metal to be inlaid (usually iron or steel, but it may be of copper or other metals with which zinc unites) is cleaned and the surface coated with a mixture of whiting and molasses for a binder. When this coating has dried, the design is traced out on the surface and the portions to be inlaid removed leaving the metal bare. The metal is then enclosed in a tight muffle which is connected with a crucible containing zinc. Hydrogen gas is now passed through so as to form a reducing atmosphere.

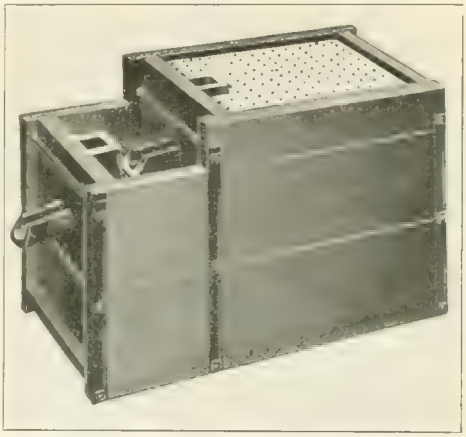
The crucible containing the zinc is heated until vapor is given off. The zinc is thus volatilized and is deposited upon the surface of the metal laid bare. Where the whiting exists, no union takes place. In this manner it is possible to deposit the zinc upon any desired design. Instead of zinc, cadmium may be used.

To case-harden a metal, the method followed is the same as previously mentioned except that after the coating has taken place, the metal article is chilled in water instead of allowing it to cool gradually. It is possible, by this method, the inventor says, to case-harden copper by applying the zinc coating and then cooling rapidly in water.

Since January 1st, 1909, the importation of foods contained in tin cans soldered with solder containing more than 5 per cent of lead has been prohibited by the Government of Uruguay.

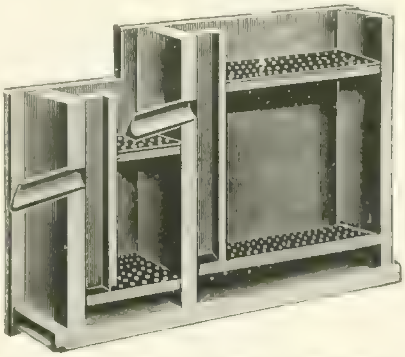
An English Filter for Saving Gold Waste.

In the manufacture of gold jewelry or kindred articles, much care is needed in saving wastes. Filings and similar refuse are readily taken care of, but washings from the hands or other water containing gold obtained in any other manner are not so easily treated.



General View of Filter for Saving Gold Wastes.

A filter for saving gold from wash waters has recently made its appearance in England and is extensively used among the goldsmiths in Birmingham and other jewelry centers



Cross-Section of Filter for Saving Gold Wastes

of that country. The device is known as the "Sentry," and is [illegible] Patent.

The construction may be readily understood by referring to the [illegible] [illegible] containing the gold is poured into the top which is furnished with a perforated partition. Over this partition, cloth is placed for the filter. As the water passes through, it falls on to another filter at the bottom placed over the perforated shelf as shown. The water now rises and flows through the spout on to a smaller filter, from which it drains through another at the bottom. From here it rises and passes out free from gold. The perforated shelves shown are covered with cloth in every case although the illustrations do not show it.

The path of the water, as it passes down through the filter and up again, serves to prevent the forcing of particles of gold out so that they will be lost. When desired, the cloth may be removed and the gold obtained from it by burning it or other desired means. A. Aston, 313 Icknield St., Birmingham, England, is manufacturing this appliance for the trade.

Electric Cleaner for Use with Low Voltage Current.

The electric cleaner has proved a very satisfactory agent for use in cleaning greases, oil and dirt from the surface of iron or steel to be plated. While theoretically equally as good results should be obtained in cleaning copper or brass as in the case of steel or iron, in practice this has not been found so. A new electric cleaner works well for a short time on copper or brass, but soon a small amount of metal is dissolved by the solution and deposits on the work being cleaned in a somewhat non-adherent film. This is particularly true in cleaners containing cyanide, and even when they are free from it, as the one subsequently described is, a slight amount of copper and zinc seems to be dissolved after a short time and which is enough to interfere with the subsequent plating. Where electric cleaners are of value is in the cleaning of iron or steel goods, and it is in their preparation for electroplating that they are extensively used.

The fact that metals can be cleaned from grease or dirt by immersing in a solution and passing a strong current through it has long been known, but it is only within the last few years that the value of the process has been thoroughly appreciated. The theory of an electric cleaner is quite simple. If a strong solution of caustic potash, caustic soda or potassium cyanide be made up and two pieces of sheet iron be immersed in it and an electric current passed through, it will be noticed that bubbles of gas will be given off at both the anode and the cathode. The stronger the current the greater the quantity of gas given off. It will also be noticed that more gas is given off from the cathode than from the anode. In the use of the electric cleaner it is customary to use the work to be cleaned as the cathode and *not* as the anode. This practice serves two purposes: First, a greater amount of gas is given off. Second, the surface of the metal is not attacked.

In the use of the electric cleaner where the work to be cleaned is employed as the cathode, hydrogen gas is given off from the surface. Coming off from the metallic surface it acts in a mechanical manner and actually forces off any grease, oil or dirt which may be present. These substances are forced off immediately so that there is no need for a prolonged "soaking" like that necessary in the ordinary cleaning of steel or iron work covered with grease and dirt.

The value of an electric cleaner, therefore, lies in the gas that is given off from the surface of the work that is being cleaned. If the gas is given off rapidly, the work is quickly cleaned, however, if slowly evolved the cleaning is slow and usually more or less imperfect. The quantity of gas that is given off per second is proportioned to the quantity of current which passes through in the same time. In other words, if an electric cleaner is used with a current of 50 amperes per sq. foot at a tension of 3 volts, then if the voltage be doubled (increased to 6 volts) 100 amperes per sq. foot will pass through and double the amount of gas will be given off per second. The number of amperes which pass through the solution, therefore, determine the quantity of gas given off. When the voltage (the pressure) of the current is increased a greater number of amperes pass through and more gas is given off.

In the use of an electric cleaner the whole object is to have the gas come off from the surface of the work as rapidly as possible so that the cleaning will quickly take place. In order to bring this about it is either necessary to use an electric cleaning solution that has a high conductivity, or to use a current with a rather high voltage in order to force the current through. If the cleaning solution has a good electrical conductivity it allows plenty of current to pass at a low voltage and the same results are obtained as in the case of a weaker solution with a higher voltage. In either case the electric current passes through the solution so as to evolve the necessary amount of gas.

An electric cleaning solution should be of an alkaline nature and in the early days of cleaning by this method, it was customary to use one containing more or less potassium cyanide. While efficacious in that the cyanide is an excellent conductor, it has the great disadvantage of being dangerous to the operator. A fine mist is always thrown up from the surface of the solution and the operator, even with an exhaust fan over the cleaning tank, inhales it and it settles upon the skin. Some very bad cases of cyanide poisoning have been known to follow the use of cyanide in an electric cleaner and the modern method is to dispense with its use altogether. It has been found possible to obtain equally as good results without it. It is also an expensive material.

Although a simple solution of caustic potash, caustic soda or mixture of them may be used for an electric cleaner, in order to obtain the necessary conductivity it must be quite strong. It has been found preferable, therefore, to use some carbonate of soda in the cleaner as not only is the solution cheapened thereby, but the surface of bright work is not so apt to be discolored. When a current with a low voltage is the only one which can be used, it is necessary that the solution be made quite strong in order to conduct the current rapidly. In the majority of plating establishments a 6 volt dynamo is used, and even with this it is not infrequent that a current of less voltage is produced on account of the lack of proper speed, poor condition of the brushes, or other difficulties. It is possible, however, by using the solution subsequently given quite hot, to obtain good results in electric cleaning even with three or four volts. The solution employed for electric cleaning with a low voltage current contains the following:

Water	1 gal.
Sal Soda	2 lbs.
Caustic Potash	2 lbs.

The solution thus made will stand between 20 and 25 degrees Beaumé. While caustic soda may be used in place of caustic potash if desired, the potash seems to be preferable as its own cleaning power is greater than that of the caustic soda.

Hot solutions always conduct electricity much better than cold ones, and for this reason an electric cleaner should always be used hot unless absolutely impossible to do so. The preceding solution, however, will give off some gas while cold and can be used for cleaning, but the results obtained from a cold solution are neither as good nor as rapid as those produced in a hot one.

For holding an electric cleaner an iron kettle or tank should always be used. A wood tank is rapidly attacked and ruined. Although the tank itself can be made the anode and theoretically cannot be improved upon, there are the difficulties in the way of doing this of obtaining a good connection and having the current pass freely from the surface of the iron. Cast iron is difficult to connect with the conductor and a good connection must be had otherwise the right quantity of current will not pass through. Then, too, the sides of the tank may be quite rusty or covered with scale so that the current will not pass through the solution from them as it should. Unless these conditions are fully met, it is always advisable to arrange some anodes of sheet iron or steel around the sides of the tank. When this is done there will be no difficulty in obtaining a good current through the cleaner. The operator can suit himself about this matter, but it will usually be found easier and more rapid to use the sheet iron or steel anodes than it will to connect up the tank direct. Usually one large anode will suffice, but under no circumstances try to economize on anode surface. If this is done, the current will not pass through the solution as rapidly as it should.

The solution should be heated as hot as possible. Owing to the increased conductivity of a hot solution, it conducts the current far better than a cold one and a greater quantity of gas is given off from the work at a certain voltage. It is not desirable to have the solution actually boiling, but from [illegible] to 180 degrees F. is suitable.

The work to be cleaned is hung in the cleaner as the *cathode* and allowed to remain for a few seconds or until gas is given off freely. The grease and oil as well as other foreign matter will at once be removed and the iron or steel left in a condition for plating. In order to conduct the current the work to be cleaned should be [illegible]

[illegible] as a good lead [illegible] [illegible] is used, for carrying the current [illegible] large, will not allow enough current to pass through it for the purpose.

Work which is very greasy or oily, like that which is received direct from the machine room, is preferably cleaned in benzine before going to the electric cleaner. Unless this is done, a thick layer of grease rapidly forms on the surface of the cleaner and interferes with the working of it. By first removing nearly all of it by benzine, the cleaner keeps in better condition.

The cleaner previously described can be used with a low voltage current and is being used every day in many establishments for such a purpose. If desired, it can be reduced with water so as to lower the conductivity and give off less gas, but unless a current of from 8 to 10 volts can be had, it is usually well to keep it as strong as possible.

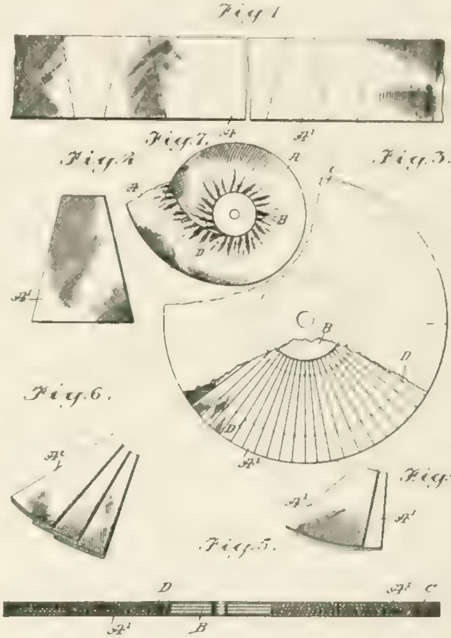
A New Form of Buffing or Polishing Wheel.

A new form of cloth wheel for use in buffing or polishing has been patented by Frank M. Levett of New York City. The wheel is herewith illustrated. It is made of cotton cloth or other textile material as the occasion may demand, and the essential feature of it is in the manner of folding the cloth to form the wheel. In order to strengthen the wheel, should the work require it, the cloth may be starched, waxed, gummed or otherwise treated before making it into the wheel.

A strip A of a woven fabric material cut straight, but preferably on the bias, is gathered or plaited or cut up into keystone shaped pieces A¹, and the strip A (see Fig. 7) or the pieces A¹ are arranged around a hub or center piece B (see Fig. 3), so as to form a ring or disk. Any desired number of rings or disks thus formed are superimposed one on the other, either spirally or otherwise, until a wheel is formed of a desired thickness. By making a wheel in the manner described, a uniform, strong, peripheral face is produced, and which face is not weaker at any point than at another and the face is not liable to fray or ravel.

The superimposed layers A¹ and the center B are preferably covered at opposite faces by disks C, and the parts are secured together by suitable fastening means D, such as staples, stitches or the like.

The keystone shaped [illegible] pieces A¹ may be doubled up, as indicated in Fig. 6, and the doubled up pieces arranged around the center B with the side edges of the pieces overlapping, but in this case the peripheral face of the buffing or polishing wheel is also not liable to unravel or fray.



Manner of Making the Buff-Wheel.

Black Coating on Zinc.

According to a German writer a durable, black coating may be obtained on metallic zinc by means of nitrate of manganese. A solution containing 2 oz. of nitrate of manganese in 1 gallon of water is made. This is applied to the *clean* zinc surface and warmed so as to dry off. The non-adherent oxide is then wiped off and the operation repeated. The writer says that six or seven treatments are necessary in order to produce the desired results. When finally completed, the surface is rubbed over with linseed oil.

The author says that the coating of peroxide of manganese so formed strongly adheres to the zinc and resists the action of acids better than copper. In performing the process care must be taken to avoid overheating the zinc so that it is softened. The manganese coating is not poisonous.

A New Continuous Annealing or Hardening Furnace.

The new internally fired, continuous annealing and hardening furnace recently placed on the market by the W. S. Rockwell Company, 50 Church St., New York City, is one of the radical improvements for treating small articles in bulk. The furnace is herewith illustrated in Figs. 1 and 2. In Fig. 1 is shown a photograph of the furnace as it was installed in a plant manufacturing small metal goods, and in which it has been in successful operation for some time. In Fig. 2 is shown a sketch of the furnace in which the general construction is shown.

The furnace is intended for annealing, hardening, or otherwise treating small articles of brass, copper, bronze, German-silver, iron or steel. In the press-working of metals they become hard and to perform additional work upon them, annealing is necessary. When the small articles produced on a press are annealed on an open pan in the manner practiced in the past, oxidation and lack of uniformity in annealing follow. The same is true in hardening steel objects. In the Rockwell furnace not only is oxidation reduced to a minimum, but absolute uniformity follows. At the same time, the item of labor is reduced to a minimum.

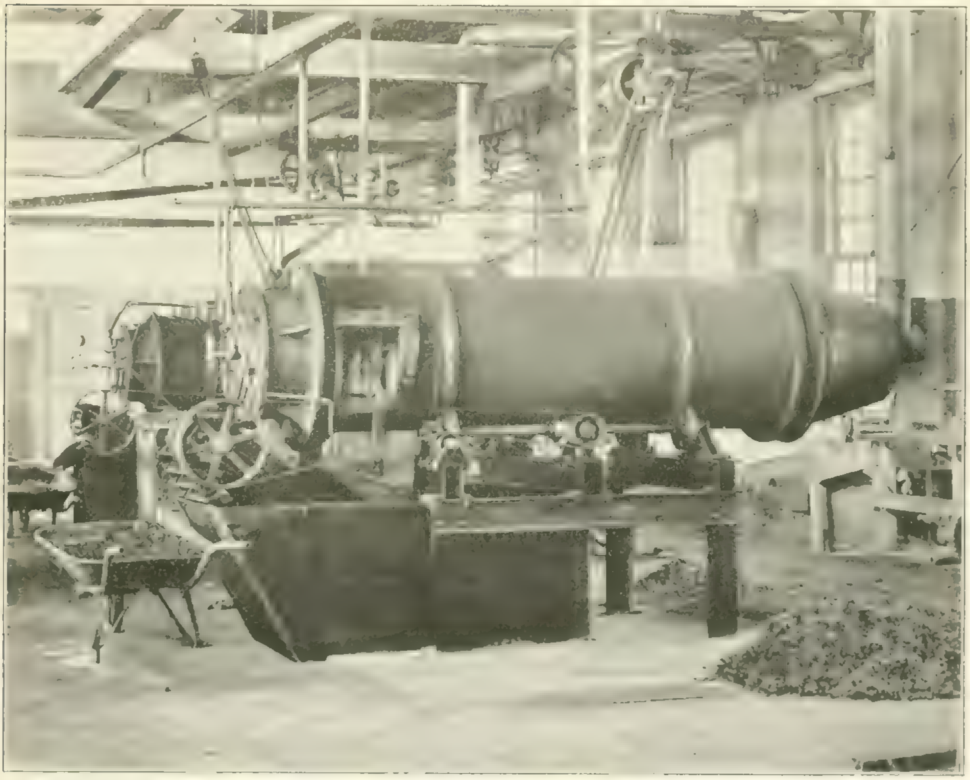


Fig. 1. Continuous Annealing or Hardening Furnace of the W. S. Rockwell Company in Operation.

The furnace is formed of a steel cylinder, with a smooth fire tile lining of helical form. It is rotated upon rollers supported in a suitable frame. Ordinarily the speed is from one to three revolutions per minute and the time of travel of a piece through the cylinder from 2 to 10 minutes. Either oil or gas may be used as fuel, and which is injected directly into the furnace in the opposite direction to that of the travel of the material. Combustion is complete and the [illegible] vent where the material enters—giving up their heat to the incoming material as they pass, the material thereby being heated up in a gradual manner.

The material is charged into the feed-drum in bulk and is then wormed through the furnace at a uniform and positive speed. The time and temperature for every piece is absolute. Starting cold, the material winds its way through the convolutions of the furnace for a distance of about 47 feet, tumbling over itself, constantly coming in contact with a new hot surface, always in the direct heat, but only reaching its ultimate heat at the point of discharge, where a pyrometer is so located as to show exactly what that ultimate heat is. Heating in this manner steel to be hardened enters the bath at its rising hardening temperature. This action is important, also, in preventing or reducing oxidation.

Each piece is heated to exactly the same temperature. As an instance of the performance of the furnace, a lot of 15,732 pieces of steel was run through one of the furnaces, and hardened in oil. Each piece was then carefully tested. Only two were found imperfect, and they from flaws in the steel itself, not from the heat treatment. The manufacturer stated that such runs were the rule, not the exception. Again, material annealed in this type of furnace in 6½ minutes was found to be cleaner and better in every way than the same material annealed for 45 minutes in a tumbling barrel type of furnace. This would indicate that protection from oxidation and a saving of time are both effected when the material is heated up gradually, never overheated and discharged the moment it has reached its ultimate temperature.

When the furnace was used for hardening a quenching tank with a conveyor was provided below the discharge spout so that the material after immersion was automatically removed from the bath quite clean and delivered into a truck or wheelbarrow. Provision was made so that two kinds of material could not become mixed; nor could any lodge in any part of the furnace or bath. By the removal of two bolts the conveyor could be easily removed from the bath, giving free access to every part for cleaning or other purposes.

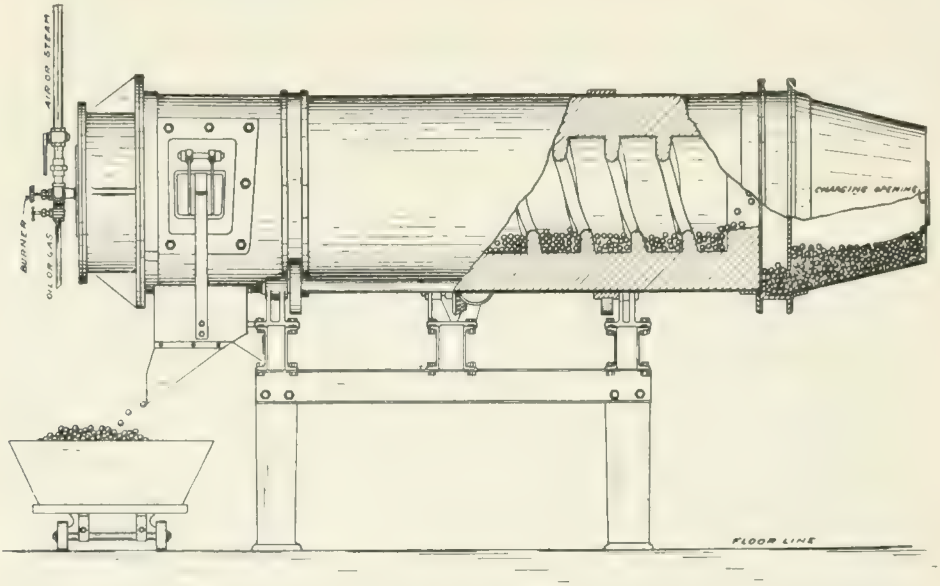


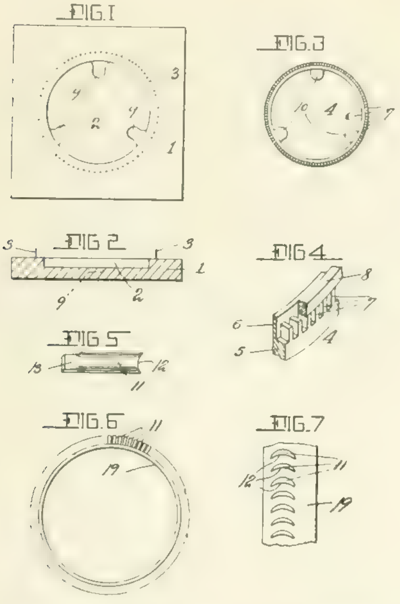
Fig. 2. Sketch Showing Construction of the W. S. Rockwell Annealing or Hardening Furnace.

The cause of rusting in tin plate is the presence of minute holes in the tin coating so that the bare iron is exposed. The rusting starts at this point and gradually increases in size.

Making Molds for Casting Turbine Wheels.

A method of making molds for casting turbine wheels has been invented and patented by Levi J. Wing of East Orange, N. J. (U. S. Patent 907,212), and which is of interest. The manner in which it is carried out is herewith illustrated:

1 indicates a temporary supporting board which is shown here as a plain wooden board having a central circular recessed portion, 2. Surrounding the central recess are a plurality of bucket spacing members 3 shown here as pins.



Sketch Showing the Detail of the Pattern.

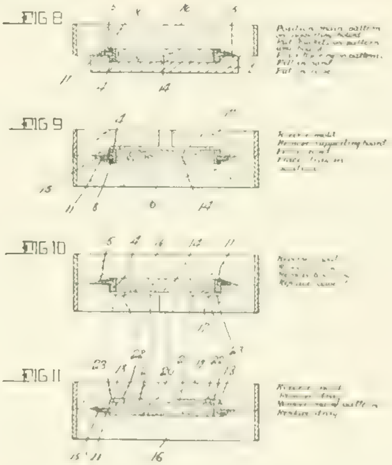
4 denotes the main pattern which is here shown as a circular ring. This main pattern is composed of a main portion 5, and a reduced portion 6 provided with the spacing members 7, whose outer periphery is flush with the outer periphery of the main portion. These spacing members extend only part of the way to the upper surface of the ring and are adapted to support an auxiliary pattern 8, here shown in the form of a ring. When this auxiliary pattern is placed on the spacing members 7, a structure is produced whose configuration is that of the bucket supporting member to be cast.

The supporting board and the main pattern ring are provided with cooperating registering members in the form of apertures 9, and lugs 10 so that when the main pattern is placed in position the spacing members on the board and on the main pattern will be in alinement.

The bucket is indicated by 11 and is provided with an impact surface 12 and with a tail 13. This bucket may be produced in any manner found suitable as by drop-forging or otherwise.

The mechanism for carrying out the process now being understood the process itself will be described.

The main pattern is placed on the temporary supporting board in such a manner that the bucket spacing members are in alinement. The buckets are then arranged circumferentially around the pattern on the board by inserting their tails 13 into the slots of the main pattern between the spacing members. The auxiliary pattern or top ring is then placed on the upper surface of the spacing members of the main pattern. The interior of the main pattern is then filled up with the body of sand indicated by 14 and the buckets are surrounded by the body of sand 15 on their upper side, which body of sand slopes downward toward the outer edge of the supporting board. One portion here called a cope and indicated by 16 of the flask is now placed on top of the partially formed mold. The operation of the part



Sketch Showing Manner of Molding

after these steps have been taken is indicated in Fig 8. The mold is now reversed and the supporting board removed. The mold is completed or filled up with sand on the other side of the buckets in a manner similar to the bed, of sand indicated by 15. The other portion here called a drag and indicated by 17, of the flask is now placed in position. These several steps are shown as having been completed in Fig. 9. The mold is reversed again, the cope is removed, the auxiliary pattern or top ring is removed and the cope is replaced. Part of the pattern has now been withdrawn. The result of these steps is shown in Fig. 10. The mold is reversed once more, the drag is removed, the main pattern is removed, and the drag is replaced. The complete withdrawal of the pattern leaves the buckets embedded in the mold and extending into the casting chamber 18. The metal is now poured and runs into the said casting chamber whereby a bucket supporting member 19 is cast on the previously formed buckets, forming a structure shown in Figs. 6 and 7. The completed mold ready to be poured is shown in Fig. 11.

The drag is provided with a pouring gate 20 connected by channels 21 to a circumferential gutter 22 which communicates with the casting chamber of the mold by means of the ducts 23.

A Method of Making Dense Carborundum.

A new method of making dense carborundum (silicon carbide) has been discovered by Frank J. Tone of the Carborundum Company, of Niagara Falls, N. Y. The usual method of making it is to heat a mixture of coke, sand, salt and sawdust in an electric furnace to a high temperature. The result is a mass of crystals of varying size.

If, however, instead of starting with the mixture previously mentioned, there is imbedded in the mass some carborundum and the electric current passed as usual, the crystals of the material will increase in size, or in other words, the new carborundum will build itself around it and form a dense, compact and non-porous material.

In making a phosphor-bronze bearing metal containing lead, no zinc should be used in the mixture. It causes the lead to "sweat" out

The Whiteness and Non-Tarnishing Properties of Chromium.

As chromium is not a rare metal and it has been found possible to obtain good electrodeposits of it, the future will undoubtedly find it extensively used.

Some time ago, Cowper Coles, the well known electro-metallurgist, made some experiments on the electrodeposition of chromium and its freedom from tarnishing. These results are now of much interest. He found that bright chromium deposits could be obtained by using for the solution:

Water .... 1 gallon
Chromic Chloride .... 3 lbs.

The electrodeposition is carried out hot and a temperature of about 100 degrees F., Cowper Coles says, is suitable. A current density of from 40 to 50 amperes per sq. foot is used. A pressure of about four volts is required for this purpose. In order to obtain a good deposit, however, free from oxide it has been found necessary to add some hydrochloric acid, so that a clear solution is obtained.

Cowper Coles determined the relative reflecting power of chromium when compared with other metals and his results are as follows:

Metals.	*Reflecting Power.*
Silver	100
Chromium	[illegible]
Platinum	71
Palladium	64

The tarnishing qualities of the same metals were also determined with the following results:

Metals.	*Loss of Reflecting Power Due to Tarnishing.*
Chromium	44
Palladium	35
Platinum	22
Silver....	10

The method of determining the loss of reflecting power was to expose the surfaces for [illegible] at a distance of about [illegible]. The reflecting power was then measured.

It will be noticed from these results that chromium has the highest reflecting power and the least tarnishing quality of any of the metals tested.

How To Make a Cyanide Copper Solution, and the Manner in which it Should be Used.

Sixth Paper.

Blisters.

Cyanide plating solutions are the ones in which blisters are formed on the deposit. Nickel solutions or acid copper ones do not give very much trouble in this respect. Many platers never have any trouble with blisters, while others seem to have difficulty in producing work without them.

.Blisters on a Cyanide Copper Deposit Magnified Several Times). Caused by too Much Free Cyanide and too Strong a Current.

By blistered plated work is meant that which has a large number of small pimples on the surface of the deposit, such as those shown in the illustration herewith given, and which are caused by the raising of the deposit from the base metal. Sometimes they are quite minute and at other times may be large, depending upon the conditions under which they are formed.

Blisters are usually caused by the use of too strong a current or too much free cyanide in the plating solution. The effect in either case is the same, i.e., the formation of too much gas on the surface of the work while being plated. Now herein lies a peculiar fact. If the solution contains very little metal so that it is really a "strike," blisters do not form, but if it is heavy in metal, contains considerable free cyanide and a strong current is used, blisters usually make their appearance, and if they do not the plater may consider himself lucky.

There are some curious features of the blistering of plated work. In the first place, rough work, like cast iron surfaces, does not blister, but a smooth one gives the most trouble. Soft metals, like pewter, antimony, lead or tin, blister more rapidly than copper or brass. If one desires to see the blistering phenomenon in its most pronounced condition, let a highly polished surface of some soft metal be used. Take a strong cyanide copper solution standing at 25 degrees and use a current of about 6 volts for the deposition. Blisters will surely form and the more free cyanide that is present in the plating solution the more rapidly they will grow.

In the use of cyanide plating solutions, a slight amount of gas is given off from the surface of the work. The stronger the current, the more the gas that is given off. Now if the plating solution is strong in metal so that as the gas is given off freely the deposit forms rapidly, a good opportunity for blistering is presented. The gas which is formed is imprisoned by the rapidly formed deposit and blisters are produced. In the case of a plating solution containing very little metal and a large quantity of cyanide, like a silver strike, for example, the deposit forms very slowly and the gas has an opportunity to escape.

Work that is not clean, too, usually blisters more easily than that which is perfectly clean. This is especially true of the soft metals.

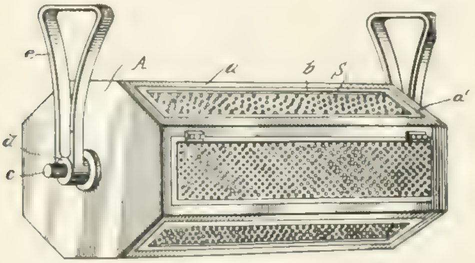
To prevent blisters, a cyanide copper solution should not be too strong and a weak current used at first until the surface has been covered. The free cyanide, too should be kept down to the lowest possible limit. Gas should come off from the work very slowly. A hot cyanide copper solution, on account of the fact that less free cyanide and less metal can be used in it, always gives the best results as far as absence from blistering is concerned. In the plating of soft metals it is strongly advocated and should be quite weak. The current should be as weak as possible and still have the deposit cover rapidly.

To sum up, therefore, blistering is caused by the use of too strong a current or by having too much metal and free cyanide in the solution, or both.

Nearly all commercial [illegible] contains a small percentage of [illegible] [illegible] compounded with [illegible]. The [illegible] making the [illegible] alloy.

Celluloid Plating Barrel Staves.

The use of celluloid or xylonite for staves of an electroplating barrel has been patented by John F. Daniels of the Hanson & Van Winkle Co., of Newark, N. J. (U. S. Patent 911,578, Feb. 9, 1909). The manner in which these staves are made and inserted may be seen by referring to the illustration.



Celluloid Plating-Barrel Staves.

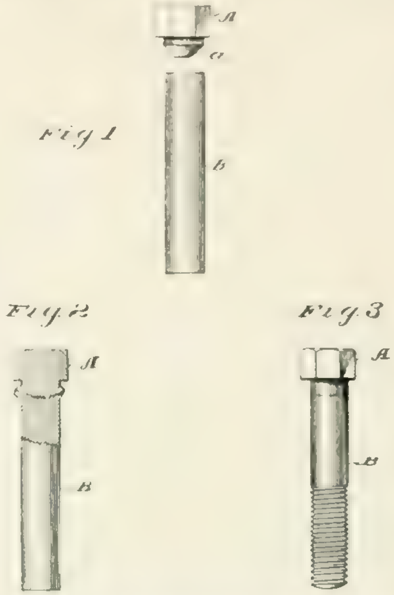
The advantages of celluloid for this purpose are many. It is strong and tough, so that thin sheets may be used without danger of breakage. It is not acted upon by the usual plating solutions. It is a non-conductor of electricity, and does not, like wood, absorb water or plating solution and thus become a partial conductor. The claim of the patent is upon the use of sheets of celluloid for the staves of an electroplating barrel.

Making Steel Bolts with Brass Heads by Electric Welding.

Owing to the different electrical conductivity of brass and steel (and iron) it has been impossible electrically to weld the two. Brass is of a much greater conductivity than that of the steel so that when an electric current is passed through, the temperature of the brass will rise far more rapidly than that of the steel. The result is the melting and dissipation of the brass before the steel arrives at its own melting or welding point.

Chas. L. Thompson of the Electric Welding Products Co. of Cleveland, Ohio, has patented a method of welding steel or iron to brass (U. S. Patent 910,431, Jan. 19, 1909) which is novel in its operation.

The method used is to reduce the cross sectional area of the face of the metal having the higher degree of conductivity below the area of the face of the other part, so that the two areas in question are in effect proportioned inversely to the respective conductivities of the



Manner of Making Brass Headed Steel Bolts.

said parts. The manner in which this is done may be seen by referring to the illustrations. In Fig. 1, the brass head A that is to be welded to the steel shank B is provided with a welding lug *a* of conical shape. The area of its apex bears the conductivity ratio previously mentioned. The welding operation then consists in passing an electric current through each piece, by means of a suitable electric welding machine, and then causing the brass and steel to press together with a steady and gradual pressure.

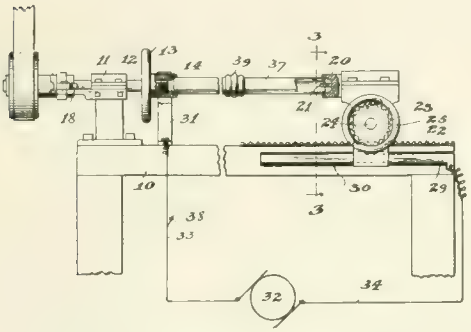
The result is the welding of the steel and brass as shown in Fig. 3. The brass then closes in as it fuses, consequently increasing the area of contact and correspondingly extending the heated area on the steel end. The result is a firm union. The brass head is not simply stuck on, but the steel and brass fibres are intermingled so that a firm union results.

The inventor states that the value of making bolts, capscrews and similar articles by this method is in the manufacture of automobiles where a strong bolt is desired, but with a head that can be scoured when desired. All of the advantages of a brass bolt with none of its weakness are thus obtained.

The Process of Lacquering Brass Bedsteads.

The increasing use of brass bedsteads renders any information on the process followed in lacquering them of interest. Not only is a fine finish necessary on a brass bed, but the lacquer must protect the surface. The bed is subject to more wear than the average lacquered article.

Wm. W. Vincent, of Kenosha, Wis., has recently patented a method of lacquering bedstead tubing (U. S. Patent 909,911, Jan. 5, 1909) which is quite novel, and he also makes some remarks upon the method followed in lacquering .



Appliance for Lacquering Bedstead Tubing.

The invention is upon an appliance, herewith shown, for lacquering the tubing and dispensing with the well known oven employed for warming the tubing previous to applying the lacquer. The tubing as designated by 37 and 39 is centered on a special lathe, and revolved either by hand or a belt. The heating of the tubing (this is necessary in applying the spirit lacquers) is the novelty of the invention, and is accomplished by means of an electric current. The current passes through the tube and may be regulated as desired. The tube is thus readily heated to the desired temperature. While in this condition, the lacquer is applied while the tube revolves. Any number of coats of lacquer may then be applied in a very short time.

In connection with lacquers and lacquering, the inventor makes the following comments:

"It has been understood for some time that what is known as "English" lacquer which is made of a hard gum (shellac) and pure grain alcohol, will stand the wear to which a lacquered brass bedstead is subjected, but owing to the fact that the lacquer is thinner (the alcohol being incapable of dissolving more than a limited amount of shellac) than the so-called 'American' lacquers, and as a single coat is quite thin, it is necessary to apply several coats.

"This 'English' lacquer. however, has heretofore been used only to a comparatively slight extent, due to the practically prohibitive expense of applying the necessary number of coats. Could these coats, or layers, be brushed on cold, one on top of the other, the difficulty would be easily solved, but in order to prevent the alcohol of one coat from cutting or softening the underlying coat, it must be evaporated instantly and immediately, otherwise the softened under or lower layers are wiped off by the brush with which the last coat is put on.

"In carrying out this process so as to quickly evaporate the alcohol, and build up a transparent veneer of sufficient thickness, it has been usual to heat each brass tube in an oven, remove it hastily, apply or brush on a coat of lacquer with great rapidity, and then return the tube to the oven for another heating of from ten to thirty minutes before the next coat could be applied.

"The tubes used in brass bedsteads are quite thin and have large radiating surfaces relative to their volumes, so that they can retain but comparatively little heat, and cool rapidly.

"As will be readily understood, the tube is heated so as to quickly drive off or evaporate the alcohol of the lacquer before it can act on the other coats of gum veneer and the alcohol on the other hand through its rapid volatilization quickly cools the heated tube to a temperature at which it is impossible to proceed with the coating without cutting or wiping off the under layers. Consequently, the workmen must act very rapidly. with the resulting likelihood of doing defective and imperfect work. As far as this process has been usd it has been customary to apply from three to six coats of lacquer with the corresponding number of reheatings of from ten to thirty minutes each. Obviously, it required ordinarily from one hour to an hour and a half to finish a tube, depending, of course, on the size of tube and number and periods of heatings. It should be noted that large ovens are required, that the work tables must be placed close to the ovens so that little heat will be lost during the transportation of the tube to the table, that the tube has to be heated hotter (300-350 degrees

Fahrenheit) than is really necessary to quickly evaporate the alcohol in order that the workman may cover it with one coat before its temperature has decreased sufficiently to prevent further coating without reheating, that owing to such overheating the color of the lacquer is considerably and detrimentally darkened, that great care needs to be exercised to have all parts of the bedstead of the same or even color, that experienced and very careful workmen only can be used for such work, that if a tube accidently comes in contact with a portion of the oven a disfiguring brown spot is caused, that the temperature of the oven must be carefully regulated, otherwise the lacquer is burned and darkened, that each tube must stay in the oven a given period and no longer, otherwise the lacquer is injuriously affected and a single tube may display several colors of lacquer, that great care needs to be taken in handling the tubes so as not to damage them or their lacquers, and that in a large plant much floor space is needed to accommodate the numerous ovens and work tables From the above the reason why this process has been but comparatively little used, even though the finished product is in demand. is made apparent. To overcome the defects of this process, to reduce the cost of using English lacquer, and generally to improve the method of applying the same, I have invented a process by the employment of which a brass tube may be provided with lacquer of several coats thickness in less than a minute in contrast to the many minutes or hour or more required by the old process, by the use of which only one fifth of the usual floor space is required, and by the adoption of which a remarkable saving in the cost of coating or lacquering bedsteads is attained.

"My invention contemplates the heating of a brass tube or other buffed or burnished metallic piece during the application of the lacquering being a continuous process, and there being no cooling or reheating of the tubes. In other words, the cooling action of the alcohol is neutralized and counteracted by applying heat to the tube during the coating operation. Preferably the tube is heated by passing a current of electricity directly therethrough, the later being of such strength as to maintain the heat or temperature of the tube substantially constant in opposition to the cooling action of the evaporating alcohol. Desirably the tube or other piece is rotatably mounted during the heating thereof, so that the operator can brush on the lacquer as the tube is turned until the successive coats are of the desired or sufficient thickness. When my method or process is employed the tube need not ordinarily be heated above 212 to 240 degrees Fahrenheit, so that no heat is wasted as by the oven reheating method, nor is the color of the lacquer changed by the heat as by the other process which makes the lacquer look thicker than it really is. By my improved scheme the operator places the buffed brass tube or tube with satin finish in the lathe-like appliance by means of which my new process may be conveniently carried out, brings the same into firm contact with the electrodes, turns on the current of electricity, wipes the tube free from dust during its rise in temperature, turns the tube either by hand or power while brushing on the several coats of lacquer, removes the tube and places it in a suitable rack, the whole lacquering process requiring from forty-five seconds to two minutes. The heat is applied at substantially the same rate as the tendency of the tube to cool, and the electric current may be controlled either by a rheostat or by opening and closing a controlling switch."

A Novel Method of Detinning.

A novel method of detinning has been patented by Harry M. Fernberger, of Dollar Bay, Mich., and Wm. W. Murray, of Philadelphia, Pa. (U. S. Patent 913,275, Feb. 23, 1909.) The tinned iron scrap is placed in a suitable retort of clay or similar material and covered with carbon tetrachloride. Anhydrous chlorine gas is then passed in and is immediately absorbed by the carbon tetrachloride. The tin is soon dissolved from the surface of the iron and if any iron chloride is formed it is not dissolved on account of its insolubility in the carbon tetrachloride.

When the tin has been removed from the surface, the carbon tetrachloride is drawn off and mixed with water. The chloride of tin (stannic chloride) which it contains is dissolved by the water and when the solution is allowed to settle two layers are found. The carbon tetrachloride, on account of its insolubility in water will separate and can easily be removed from the chloride of tin solution. It is then fit to be used over again. The chloride of tin finds ready sale after concentration

Notes on Babbitt and Bearing Metals.

In the course of an interesting paper on this subject read before the members of the British Foundrymen's Association, Birmingham branch, on January 23, Mr. A. H. Hiorns, the Principal of the Metallurgical Department of the Birmingham Technical School, pointed out that both hardness and plasticity were essential to the success of a bearing metal—hardness to reduce the amount of friction and cutting, plasticity to ensure uniformity in the wear of the bearing surface. Those characteristics might be combined in a metal composed of hard grains embedded in a plastic matrix. That was the main principle aimed at in anti-friction alloys. Care must be taken both in mixing and casting the alloy to obviate defects in the structure of the metal, as, for example, segregation, coarse crystalline structure, oxidation products and enclosed gases. Segregation often resulted from mixing, especially with copper or tin-lead alloys in which excessive lead had been introduced. The lead would separate out with some of the copper, forming dark patches and producing relatively high heating capacity. It might be prevented by quick cooling; but the metal then was less ductile. Coarse crystalline structure was due to a high temperature when pouring the metal into the mould, but it might also be due to the presence of impurities, such as antimony, phosporus, and silicon, the last two being sometimes added as deoxidisers, which, if introduced in small quantities, remove oxygen, close up the grain, and thereby increase the strength; but if in excess, caused compounds to be enclosed, as well as including coarse crystallization, with a loss of ductility and durability, and an increase in heating capacity. The presence of gas or dross due to careless casting also caused weakness in the bearing metal. Alloys with a high tensile strength and elongation ensure durability and a lessening of wear. Proceeding to the consideration of the various alloys commonly used for bearing metals, Mr. Hiorns pointed out that the ternary compounds were more suitable for the purpose in view, although a lead-antimony alloy with from 13 to 25 per cent. antimony was sometimes used. The 13 per cent. alloy is employed for railway work in America. As the antimony increases, the durability decreases; but the friction becomes less, and the temperature of running is diminished at the same time. Alloys of lead, tin, and antimony are superior to binary alloys of lead and antimony as anti-friction metals; but the tin must exceed 10 per cent., but not necessarily 20 per cent., while the antimony may vary between 10 and 16 per cent. Amongst other ternary compounds a tin-antimony-copper alloy with 83 tin, 11½ copper, and 5½ antimony possesses remarkable compressive strength, and the best alloys should be within 3 or 4 per cent., of that composition. Babbit metal consists of tin 89, antimony 7, and copper 4. An alloy of lead 65, antimony 25, and copper 10 is used for packing locomotives and tenders, on account of its resistence to compression. In discussing the zinc-tin-antimony alloys, Mr. Hiorns remarked that though an excess of zinc gave a high compressive strength, they were not much used for bearing purposes, owing to their tendency to become brittle when heated. The most important of the ternary series are the copper-lead-tin alloys, and the best of those for general purposes is one containing copper 64, tin 5, lead 30, and nickel 1 per cent. Mr. Hiorns pointed out that the addition of lead to copper-tin alloys rendered them less liable to heat under the same lubrication, and at the same time diminished the wear. On the other hand, it increased the plasticity and consequently diminished the compressive strength of the alloy. The constituent of bronze he said, was the reverse of that of white alloys. Instead of hard grains in a plastic eutectic they had soft grains in a hard eutectic for the same degree of plasticity. The bronze had a greater tendency to cut than the white alloys, and thus produce deterioration of the axle.—*The Ironmonger.*

The electrodeposition of chromium, on account of the hardness and non-corrosiveness of this metal, seems to hold out considerable promise. The numerous investigations carried on from time to time will undoubtedly bear fruit in the near future.

A better draught is obtained with a brick chimney than with an iron one. A brass foundry should always be equipped with a brick chimney, although the cost is greater than one of iron. The results, however, are so much better that the extra expenditure is warranted

An Improved "Schwartz" Tilting Crucible Furnace.

An improved tilting crucible furnace has been patented by F. H. Schwartz, of Chicago, Ill., and assigned to Kroeschell Bros. Company, of the same city (U. S. Patent, 911,271, Feb. 2, 1909). The construction of the furnace is herewith shown. The object is to obtain the greatest intensity of heat at the bottom of the furnace so that the melting of the metal will begin at the bottom of the crucible. The metal will then be melted uniformly and without overheating it at the top.

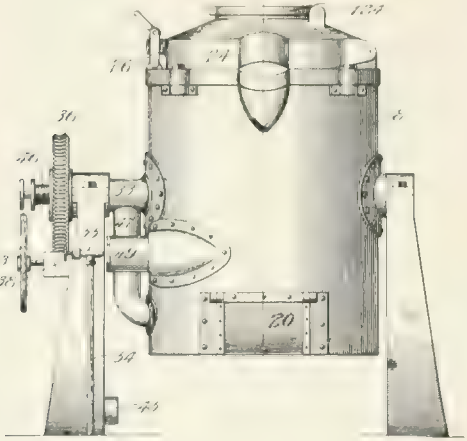


Fig. 1. Front View of Schwartz Furnace.

The furnace is intended for gas or oil, but on account of cheapness oil is the favorite fuel. The furnace is of the tilting type so that the metal may be poured without removing the crucible from the fire.

To operate the furnace the supplemental cover 124 is raised for charging into the crucible through the cover opening 30 the metal to be melted. Thus the cover 24 need never be opened except for introducing and removing a crucible and for repairing purposes, so that the furnace remains closed while in operation and also while pouring, with the advantage of thereby avoiding impairment of its heat. With the valve 55 then opened and the fuel ignited, the fuel is drawn through the nozzle 52, (drawing air with it through the funnel 152), by the vacuum produced in the nozzle by the air under pressure passing through the ducts 352 and space 53 from the branch pipe 147 for mixture with the gaseous or vaporized fuel, the mixing being further enhanced by the flow of the mixture through the port 51 into the bottom part of the furnace-chamber, wherein the hot gases gyrate about the crucible, to escape, in spent condition, at the outlets 30, 130. In coursing about the bottom of the furnace-chamber the gases, which enter the same in a condition of more or less incomplete combustion, encounter the supply of air from the channel 13, 14 entering the furnace chamber through the ducts 114 and 214, this air being heated, by contact with the hot surface of the furnace, in the channel wherein it affords a stored supply for feeding the furnace through the diagonal ducts. The gases in their course from the port 51, encounter the air forcibly entering their path in the same direction through the ducts 114 and 214 and affording the additional quantity of air to complete combustion of the unconsumed gases, whereby the greatest intensity of the heat is generated at the base of the crucible to exert the bottom-melting function referred to upon its contents, and the heat of the gases gyrating from that point is rendered uniform in its distribution about the crucible.

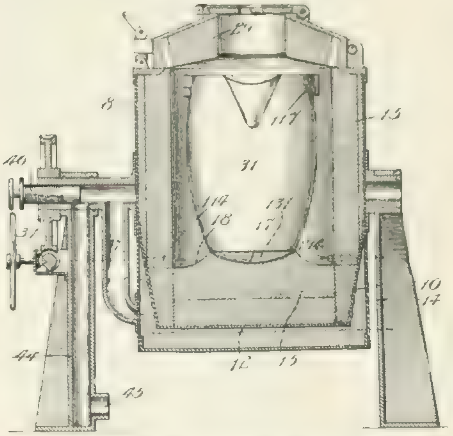
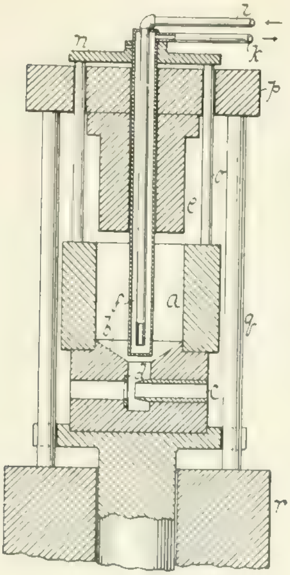


Fig. 2. Cross-Section of Schwartz Furnace.

The usual solution employed for lead plating consists of a solution of caustic potash containing all of the oxide of lead (litharge) that it will take up by boiling the two together. The solution is made quite strong and stands from 25 to 30 degrees Beaume.

Apparatus for Making Lead Cable.

Large quantities of lead cable are now manufactured for use in underground work where the electric wires are protected from moisture by the covering of lead pipe. It is customary to make this cable in the same manner that lead pipe is made and there have been more or less difficulties connected with its manufacture. Chas. Tatham of New York has invented a method of making such cable (U. S. Patent 911,459, Feb. 2, 1909) which simplifies the process to a certain extent. The object of the invention is to avoid injury to the cable while the lead is being applied. The cooling of the lead is brought about in a manner herewith described. In the sketch accompanying this article is shown a cylinder or reservoir *a* for holding the lead.



Apparatus for Making Lead Cable.

Bottom piece *b* has a core *c* and a die *d* arranged for a wire or cable to pass therethrough. This passage *d c* is so bored or arranged that as the cable travels therethrough lead from the reservoir can be pressed about and made to incase the cable, and also be preliminarily cooled to such an extent that such lead while tightly inclosing the cable will not burn or injure the same.

A ram *e* will force the lead or material about the cable passing through the passage *d c*. As the cable enters the die *d* and passes on and out of the apparatus the surrounding lead will form a hard or durable and flexible protection. Preliminary cooling of the lead before it clasps or contacts with the cable is effected by a suitable medium such as water suitably applied. The ram *e* is carried by cross head *p* fixed on standards *q* operated by base *r*. The cable enters core *c* and leaves at die *d* and the cooling is effected by tube *f* passing through the ram *e*. The tube has inlet *i* and outlet *k* and this tube *f* works through ram *e* and is held in proper relative position in the cylinder by cross head *n* and upright supports *o* attached to the cylinder *a*.

The outer wall or shell of the water tube *f* can be made free from joints or connections or all of one piece at the part which projects through the ram and into reservoir *a*. As the great pressure of ram *e* entering reservoir *a* is apt to cause any joint to loosen and as the consequent leak would injuriously affect the process such leak is to be avoided.

As seen the conduit extends axially through the ram *e* and the ram can reciprocate while the conduit remains stationary.

For cleaning articles for plating and which are too large to enter the potash kettle, slacked lime is excellent. The lime is allowed to slack and become dry. It is then mixed with water to a paste and the metal rubbed with it by means of a soft cloth. The lime is so fine that it will not scratch the surface of the metal like pumice, and at the same time it is slightly alkaline. It has been used for years on such work as tubing, railings, large sheets, etc., and has given good results.

Too much free cyanide in a brass solution together with ammonia causes the deposition of zinc on the work. If there is an excess of free cyanide and little ammonia, a brass deposit of varying color is produced, while a large excess of both free cyanide and ammonia causes the deposition of zinc. A solution without ammonia may contain more free cyanide and have it work properly, than when it is present. Ammonia always causes zinc to deposit to a greater or less degree.

Questions and Answers.

Question No. 601. Are electrolytic copper anodes better than rolled or cast ones? We have never tried them and wish to find out about them.

Answer. Owing to the large amount of surface exposed (on account of their rough surface) electrolytic copper anodes give up metal more readily than rolled or cast anodes and are very satisfactory when new. As they become old, however, they are apt to dissolve away quite unevenly. Holes form and the anodes often fall apart. On this account, many platers prefer cast or rolled copper anodes.

Question No. 602. We send you a piece of brass which was made for art work and you will note that it is very porous. The surface is also discolored by the acid of the dip, through which the castings are run, working out. We are unable to stop the porosity. Our brass molder is at his wit's end, and though he has been in the business for years, he is unable to remedy the difficulty. The mixture is 16 lbs. of copper, and 6¾ lbs. of spelter. The work is art goods, such as candlesticks, etc. We have tried several brands of zinc. No aluminum is used. Where is the trouble?

Answer. The casting shows that it contains aluminum. Although your molder may not have added it intentionally, it has actually entered the mixture. The casting that has not been dipped shows it in a decided manner by the appearance of the skin. If you use aluminum at all in your foundry, it is readily understood how a small amount may have become introduced in scrap, from the stirrer or skimmer or other means. Some spelters made from scrap also contain it. The effect of aluminum on brass is well known, and while it is possible to make good castings of brass containing it, special gating and a low pouring heat are required to produce them. When brass containing aluminum is poured "hot," the castings are quite dirty, and yours is one of this kind. For art work, it is usually advisable to leave out aluminum and use nothing but copper, spelter and small quantities of tin and lead as the case may require.

Question No. 603. I have taken charge of a nickel plating plant and the nickel deposit comes dark and streaked. Neither red nor blue litmus paper is changed, and the current is right. There is a coil of galvanized iron pipe in the bottom of the tank, used for heating the nickel solution during cold weather. World this cause the trouble?

Answer. The galvanized iron pipe is unquestionably the cause of your difficulty. The zinc is attacked, and also the iron. The solution became contaminated with them. It is a well known fact that zinc will cause a nickel deposit to run dark. In fact, zinc is added as one of the ingredients of a black nickel solution for giving a dead black deposit. Use a coil of lead pipe in the bottom of the tank as lead is not attacked by the nickel solution.

Question No. 604. How much difference is there between a casting of manganese bronze cast in sand and one cast in a chill mold? I mean in regard to tensile strength.

Answer. The casting made in a chill mold is much stronger and has a greater elongation and elastic limit. It is impossible to inform you of the exact difference as it depends upon the manner of casting and the heat in pouring, but it is not uncommon to find a chill casting fully twenty or thirty thousand pounds stronger per square inch. Not only is this true of manganese-bronze but of phosphor-bronze, brass and other copper alloys.

Question No. 605. Can a good verde-antique be put on iron castings by first copper plating them and then applying the corrosive solution? Or is it better to use the pigment process?

Answer. It is possible to produce a good verde-antique finish on iron castings by the corrosion process if a very heavy copper deposit is put on. Unless it is done, however, the copper will be cut through and the iron exposed. For this reason, many concerns prefer to first copper plate the castings, then oxidize them in liver of sulphur and afterwards apply the verde by the pigment process. A good operator can produce an excellent job by the use of pigments.

Question No. 606. What is the best material for painting the outside of pickling tubs and iron pipes in our dip room? We find quite a number have been badly attacked by acid.

Answer. Asphalt paint is the best. It should be heavy, however, in order to last. The best application is hot, melted asphalt and not the commercial paint. A very thick coating is then obtained that will last a long time.

Question No. 607. We have experienced some difficulty in brass plating castings made of 78% of zinc, 15% of tin and 7% of copper. What is the best method of doing it?

Answer. The best method is to scour them clean and then flash in a hot cyanide copper solution to produce a coating of copper. They may then be brass plated without difficulty. Possibly your brass solution is not in good working condition. It is advisable however, to first copper plate the castings previous to brass plating.

Question No. 608. In making bars of solder or babbitt metal, how is it possible to produce the smooth surface found on those generally sold? Our bars come rough and also shrink badly.

Answer. In order to produce a smooth surface on bars of solder or babbitt metal, it is necessary to pour at as low a "heat" as possible and yet have the bars run. In addition to this, the mold must be kept cold and the metal not allowed to fall from any height into the mold. The lip of the pouring ladle is held as close to the mold as possible. The molds are cooled by water after each pouring.

Question No. 609. I am sending you a sample of a new copper solution that I have made up. I cannot obtain any copper deposit from it. You will notice after the solution has settled that a white sediment forms in the bottom which looks like sugar. I have tried hydrant water, rain water and yet I cannot obtain any deposit. Where is the trouble?

Answer. We have tested your solution and find that it stands about 40 degrees Beaumé. This is altogether too strong, and, in fact, is about as strong as it is possible to make such a solution. It is like oil in consistency. You do not say what kind of work you are plating, but you can certainly add at least an equal amount of water to bring it down to 20 degrees Beaumé or less. From 10 degrees to 15 degrees is all right for certain classes of work. We also found that there is very little copper in the solution, and a large amount of free cyanide. By adding water to bring the solution down to about 20 degrees and allowing it to take up some more carbonate of copper, we were able to produce a good copper deposit. It is probable that the carbonate of copper, from which you made your solution, was dry and hard, so that cyanide would not readily take it up. We suggest the use of plastic carbonate of copper as it dissolves very readily.

Question No. 610. What effect does manganese have on aluminum?

Answer. Manganese hardens aluminum, but owing to its high melting point it has been found impossible to use more than a small quantity of it for a hardening ingredient. When a considerable quantity is employed the aluminum does not run freely. The melting point of the mixture is raised by the presence of the manganese, and the melted metal becomes thick. The best results are obtained by using a small quantity of manganese with copper, as the hardener for aluminum. From 1 to 2 per cent of manganese are generally employed for this purpose.

Question No. 611. Is it possible to fire-gild hard brass without drawing the temper and softening it? I have a job that I would like to try in fire-gilding, but it is of thin sheet brass, hard rolled, and I fear that the temper would be drawn. If so, I could not use it.

Answer. You cannot use fire-gilding on the work you mention as it is necessary to heat the article nearly to redness to drive off the mercury in the gold amalgam used. A lower temperature will not suffice.

Question No. 612. What is the difference between *hard-lead* and *antimonial-lead?*

Answer. There is no difference. The two names are used to designate an alloy of lead and antimony. Hard-lead is the older name and has been used for many years. Antimonial-lead is of comparatively recent origin, and is used mor extensively, perhaps, than hard-lead.

Question No. 613. In dipping brass castings, should the same dip be used as that employed for dipping sheet brass?

Answer. No. A dip containing more aqua-fortis should be used. The following formula will give you good results on both yellow and red metal castings:

Oil of vitriol	5 gallons
Aqua-fortis	5 gallons
Common salt	2 oz.

If the solution does not work smoothly, add a small quantity of water, but be careful not to add too much. Try a pint in ten gallons. It frequently is all that is required. If the dip works slowly and unevenly, water is needed, but an excess will cause the dip to work too rapidly and pit the surface of the metal.

Question No. 614. What percentage of copper should ingots made from light-brass contain? We melt ordinary scrap light brass and do not add copper or zinc at all.

Answer. We should say that your ingot brass should run from 66 to 70 per cent. in copper as the majority of light brass is made from sheet brass or wire containing less than 66 per cent. of copper. Ordinarily it may be said that common sheet brass contains about 63 per cent. of copper, but in the light brass you use, there is probably some low brass and more or less brass used for spinning or drawing which usually contains more than 63 per cent of copper. In melting there is some loss of zinc so that the copper contents of your ingots will probably be from 66 to 70 per cent.

Question No. 615. Are the results obtain- by the use of a hot cyanide copper enough better to pay for rigging up for it? I have been of the opinion that there is more imagination than fact in the use of hot solutions.

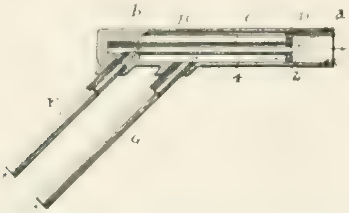
Answer. There is certainly no imagination or sentiment about the use of a hot cyanide copper solution. It will pay you to rig up for it. You will save the cost many times over in time and quality of work. Try and be convinced.

Question No. 617. Is the use of a porous cup the best method of making up a small gold solution?

Answer. Yes. You will find it very satisfactory. It is possible to make a good gold solution in this manner with very little trouble and without much apparatus. The porous cup is extensively used for making small solutions for gilding, but for large ones it is too slow.

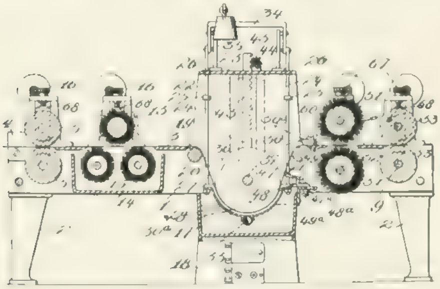
Patent Abstracts.

912,500, Feb. 16, 1909. ACETYLENE BLOWPIPE. Howard H. Snyder of Cleveland, Ohio. A blowpipe for use with a mixture of acetylene and air. The inventor states that this blowpipe is much simpler than those now used for this purpose.



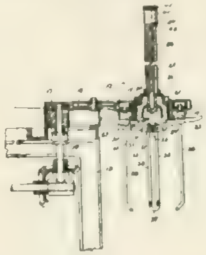
911,960, Feb. 9, 1909. COMPOSITION FOR TREATING FUEL. Edward H. Ellis of Boston, Mass. This composition consists of potassium chlorate, 1 lb.; sal-ammoniac, ½ lb.; oxalic acid, 1 lb.; common salt, 15 lbs. and water, 50 gallons. When coal is treated with this composition it is stated that it is all consumed without smoke.

911,613, Feb. 9, 1909. TINNING OR COATING MACHINE. Chas. C. Roberts of Ansonia, Conn. This machine has been designed more particularly for tinning sheet copper on one side, although it is possible to arrange it so that both sides may be tinned. The tinning is carried out in a semi-automatic manner and the sheets delivered in a completed condition. Details of the machine can only be obtained by consulting the complete specification.



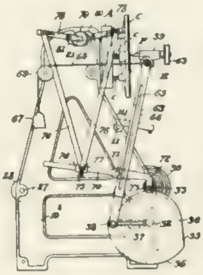
911,244, Feb. 2, 1909. APPARATUS FOR METAL FOUNDING. Frank P. Johness of Racine, Wis. A chaplet so constructed that the stem may be removed when desired.

911,305, Feb. 2, 1909. INVERTED DRUM FOR WIRE DRAWING MACHINES. Jas. A. Horton of Providence, R. I. Assignor to the Iroquois Machine Company of New York City. A drum for wire-drawing, constructed in such a manner that the coils of wire are delivered downward instead of being lifted off in the usual manner from an upright drum. Considerable new mechanism has been applied to the drum to allow for the change in delivery. Less labor is required when the drum is used.

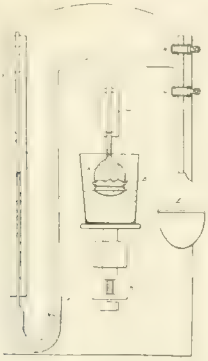


912,081, Feb. 9, 1909. COMPOUND FOR CLEANING, POLISHING AND PLATING METAL. Margaret Curtin of Brooklyn, N. Y. A compound for cleaning metal work, such as faucets, and at the same time coating them with metallic silver. It consists of whiting, 3 lbs.; cream of tartar, ¾ oz.; cyanide of potassium, 3¼ oz.; nitrate of silver, 1¼ oz.; oil of cloves, ¾ oz.; oil of sweet almonds, ¾ oz.; water, 1 gallon. The paste thus formed is rubbed on the metal. (This material is quite poisonous and could scarcely be acceptable for household use.)

912,240, Feb. 9, 1909. ENGRAVING MACHINE. Valdemar J. Hansen of New York City, assignor to S. A. Norring of the same city. A machine for cutting dies and similar work, in which it is possible to enlarge or reduce the design while cutting. The design may be produced either in relief or in intaglio.

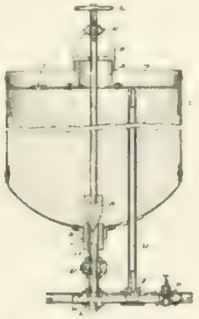


911,277, Feb. 2, 1909. GLUE TESTER. Edmund S. Smith of Niagara Falls, N. Y. An apparatus for testing the strength of glue or gelatine. A jelly is made of the material to be tested, and the amount of pressure taken to force a plunger a certain distance into it is then measured. As the adhesive power of glue varies with the strength of the jelly, the apparatus is capable of giving a good valuation.

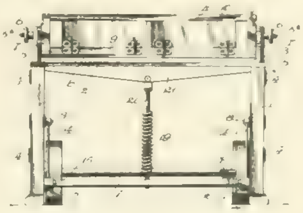


913,414, Feb. 23, 1909. DEVICE FOR POLISHING BRASS. Carl E. Merrill of Nashua, N. H. A device for polishing the brass plugs used in telephone exchanges. The device is operated by hand and the plug is inserted in a hole through the side. Upon turning the handle a polishing wheel polishes the plug. The object of the device is to supply suitable means for keeping these plugs clean so that a good connection is obtained.

911,431, Feb. 2, 1909. SAND BLAST APPARATUS. David A. Nichol of New York City. In this invention a simple, strong and efficient apparatus is provided, in which the flow of sand to the air blast pipe can be controlled with exactness. The flow of sand is also assisted by the equalizing pressure pipe. A sand blast is thus produced in which the sand delivery can be easily controlled.

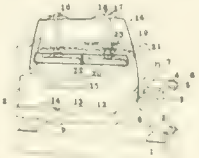


911,066, Feb. 2, 1909. MOLDING MACHINE. Dennis Parks of St. Louis, Mo., Assignor to the Mitchell-Parks Mfg. Co., of the same place. A molding machine in which the sand is packed around the pattern by jarring. The flasks and parts supporting it are counterbalanced so that they may be raised or lowered to produce the jarring effect without the expenditure of much power. The machine is adapted more particularly for making small castings, and is intended to be operated without power.



913,616, Feb. 23, 1909. ELECTRICAL METAL WORKING APPARATUS. Alvin E. Buchenberg of Toledo, Ohio. Assignor to the Toledo Electric Welding Company. An apparatus for welding, forging, bending or upsetting metal while heated to the right temperature by passing an electric current through it.

912,528, Feb. 16, 1909. MOLD. George Bauer of Akron, Ohio. This invention relates to molding flasks, and the object is to provide one with suitable supports so that after casting it may be tilted and the contents dumped. New means are also provided for securely uniting the cope and drag.



911,358, Feb. [illegible] 1909. METHOD OF PREPARING NON-AQUEOUS MIXTURES AND PRODUCT THEREOF. Edward G. Acheson of Stamford [illegible]. A method of making a mixture of oil and graphite for lubricating purposes. The deflocculated graphite is mixed with water and then the water is displaced by oil.

Trade Items.

Mexico now has a cartridge factory in operation in Mexico City and which has a daily capacity of 50,000 cartridges. The machinery was made in Germany and installed by Germans.

The U. S. Electro Galvanizing Company, 1 Park Ave., Brooklyn, N. Y., manufacturers of the patent self-emptying plating barrel and electroplaters' supplies, are sending out to the trade their Bulletin No. 98, which describes their plating barrels for small work. This barrel not only plates, but empties and dries the work after it has been plated.

The largest testing machine ever constructed has recently been made by Tinius Olsen & Co., the well known testing machine manufacturers of Philadelphia, Pa., for the U. S. Geological Survey. The machine is 80 feet in height and has a capacity of 10,000,000 lbs. It has been designed primarily for testing stone and concrete. The machine is operated by hydraulic pressure.

The Rockwell Furnace Company, 26 Cortlandt St., New York City, are sending out a circular to the trade announcing that they have purchased the factory, drawings, patterns, etc., of the Rockwell Engineering Company which went into liquidation during the summer of 1908. The business will now be transacted under the name of the Rockwell Furnace Company, who with their increased staff and extended facilities will be able to take care of all business submitted to them.

The plant of the Cheshire Rolling Mills at West Cheshire, Conn., with the exception of the casting shop, was entirely destroyed by fire on March 9th. The origin of the fire is unknown. This mill was formerly the Cheshire Brass Company, but a short time ago was leased by John H. Morse and Emil Hess and conducted under the name of Cheshire Rolling Mills. Rolled brass was manufactured. The mill was owned by John Shares, of New Haven, Conn. The loss is estimated at about $18,000 with some insurance.

The Hoskins Manufacturing Company has been incorporated with a capital stock of $500,000 to take over the Hoskins Company, Chicago, Ill. The office and factory have been moved from Chicago to Detroit, Mich., where a new plant has been equipped at 453 to 471 Lawton Ave. The manufacture of Electric Furnaces, Pyrometers, and Heating Appliances will be continued on a larger scale than in the past as the manufacturing equipment is now superior. The management of the company remains the same. The officers are: President, Henry Post; vice-president and sales manager, W. W. Talman; general manager and treasurer, E. F. Hoskin; secretary, Johathan Palmer, Jr., A. L. Marsh will continue with the company as electrical engineer.

C. H. Talcott & Co., 273 Asylum St., Hartford, Conn., the well known chemical dealers, are supplying Eastern trade with chloride of zinc for use as a flux in melting aluminum. Some of the leading aluminum founders have adopted this flux. It is carried in stock by C. H. Talcott & Co.

C. W. Leavitt & Co., 220 Broadway, New York City, have been appointed American selling agents for The Societe Maritime & Commerial, Antwerp, Belgium, and will handle their iron and copper pyrites, copper precipitate, copper matte, manganese ore, and other metallurgical products.

The Atwood-Castle Company has succeeded the Atwood Manufacturing Company, of Amesbury, Mass., manufacturers of automobile lamps. The change is one in name and the business remains the same. W. I. Atwood is president and treasurer, F. E. Castle, vice-president, and I. H. Atwood, secretary and general manager.

The Levett Manufacturing Company have been incorporated at Matawan, N. J., with a capital stock of $300,000, to manufacture and deal in electroplaters supplies and machinery. Geo. W. Levett is the president; Charles M. Levett, vice-president; Frank M. Levett, treasurer; and H. S. Wyckoff, secretary. A factory has been purchased and manufacturing commenced. Nickel anodes, salts, polishing materials, dynamos, buffs, and a general line of plating and polishing goods will be put on the market.

The Eureka Pneumatic Spray Company, 400 Canal St. New York City, manufacturers of sprays for spraying lacquer, japans, varnishes, etc., have recently brought out the "Record" Air-Brush Sprayer for this class of work which is an important improvement in sprayers. It has a glass reservoir so that no contamination from metal follows. It is also provided with an agitator tube for certain classes of work. The price of this sprayer is quite low and enables everyone to use it.

The Auroid Manufacturing Co. has been incorporated at Bridgeport, Conn., to manufacture some new metals called "Auroid," "Mellen's Bearing-Bronze,' and "Duralum." Auroid, it is stated, has the color of gold and does not give off fumes when melted. The bearing-bronze is intended for severe bearing work, and the "Duralum" is a light aluminum alloy (sp. gr. 2.56). These metals are made after the formulas of Greenville Mellen, the secretary and treasurer of the company. The foundry of the company has been located on Whiting St., but has now been moved to Howard Ave. and Spruce St. Delo C. Mellen is the president of the company; Ralph E. Slaven, vice-president; and Grenville Mellen, secretary and treasurer.

J. F. Wander & Sons, of Westbrook, Conn., are now manufacturing art metal goods of high grade. Art novelties in bronze and silver are their principal line.

C. W. Leavitt & Co., the well known metal and ore dealers now located at 220 Broadway, will after March 20th be located in the Hudson Terminal Building, 30 Church St., New York City.

Samuel H. Newman is building a brass foundry in Algoma, Wis., to manufacture plumbers' brass goods. The foundry will cost about $10,000 and will be in operation in about two months.

The Hancock Mfg. Co., of Marshall, Mich., manufacturers of lubricators and brass specialties are considering moving their plant elsewhere. A new brass foundry will then be built. They have Medina, N. Y., under consideration as a location.

The business of the Corbin Bros., Co., of New Britain, Conn., manufacturers of cabinet locks, has been purchased by Philip Corbin and Charles Glover of the American Hardware Co. The new owners have obtained practically all of the stock and will operate the business without change. The Corbin Bros. Co., is capitalized at $200,000 and employ about 100 hands.

Owing to business depression and overproduction, some of the foreign aluminum producers are turning to other products. The Neuhausen Aluminum Industry Company have commenced, at one of their Switzerland works, the manufacture of nitric acid and nitrates from atmospheric nitrogen, and are utilizing a portion of their water power for this purpose.

Byrd Walker, formerly of A. Klipstein & Co., and J. J. Scheuch, of the Grasselli Chemical Company, have purchased the White Tar Company, of 5 Front St., New York City, an old concern dealing in tar products. The company will be conducted under the same name but a complete line of chemicals will soon be added in addition to the tar products. Mr. Walker, the president, was associated with A. Klipstein & Co., for twenty-three years, and Mr. Scheuch, secretary and treasurer, with the Grasseli Chemical Company for sixteen years.

At the annual meeting of the Benedict Mfg. Company, of East Syracuse, N. Y., recently held, the following officers were elected and the regular annual dividend of seven per cent declared: President, H. L. Benedict; first vice-president, Geo. N. Crouse; second vice-president, C. C. Graham; secretary, Chas. Van Wagner; assistant secretary, John Bailey; treasurer, R. B. Roantree; assistant treasurer, Newton Owen. Directors, Geo. N. Crouse, Chas. Van Wagner and H. L. Benedict. This company manufacture art metal novelties and recently purchased the Warner patent for metallizing roses for use as hat pins. They are now turning out over 2,000 per day of these pins.

A small brass and steel foundry is being started by L. A. Ayers in Omaha, Neb. His present address is 4027 Seward St.

The Risdon Tool Works, 63 Canal St., Waterbury, Conn., are to install a nickel plating plant in their factory.

The Monel Metal Manufacturing Company have been incorporated in New York by Edmund C. Converse of Greenwich, Conn.; Joseph R. Delamar of New York City; and Elias M. Johnson of Spuyten Duyvil, N. Y. Monel metal castings will be manufactured.

The Perkins Manufacturing Company, of Westfield, Mass., are now manufacturing desk sets, smokers' articles, novelties, etc., from "Arabesque-Ware." This ware is something new and consists of mahogany inlaid with brass so as to form articles of much beauty.

The Raritan Chemical Company have organized and opened offices at 100 William St., New York City, for the manufacture and sale of chemicals and supplies for electroplaters and other manufacturers. A specialty will be made of chemicals used in plating.

Samuel Butter & Co., 289 Commercial St., Boston, Mass., were recently awarded $20,000 by the Special Board of Naval Officers appointed to investigate the particulars connected with the sale of the old dry dock at the Portsmouth Navy Yard, Portsmouth, N. H., and which was purchased by the aforesaid company. It was claimed by Samuel Butter & Co., that they were misled as to the material which the dock contained and that they paid several times more than it was worth.

The Reinhold No-Flux Aluminum Solder Company, recently incorporated, reports very active business, and numerous inquiries from not only the United States, but every quarter of the globe. Recent shipments of their solder have been made to Scandanavia, Germany and Russia. The company recently closed several agencies in the far West. Many investigators and skeptical workers in aluminum have been agreeably surprised at the results secured through the use of the Reinhold solders.

The Bridgeport Metal Goods Manufacturing Company has been incorporated by Anker S. Lyhne, Chas. Phillips, Herman K. Beach, and Frank Harmon at Bridgeport, Conn., with a capital stock of $37,000, all paid in. Anker S. Lyhne is president; Herman Beach, treasurer; Frank Harmon, secretary; and Chas. Phillips, superintendent. Mr. Phillips has had charge of the plating department of the Bridgeport Brass Company for thirty-one years and the other members of the company have been connected with the same concern. A factory at Spruce and Howard Ave. has been leased and machinery will be installed as rapidly as possible. Electroplating of all kinds will be carried on. The manufacture of small brass and other metal goods will be the business of the company.

The Burns & Bassick Co. have succeeded Burns, Silver & Co., of Bridgeport, Conn., manufacturers of cabinet hardware. The change is only in name and the business will be continued as heretofore.

The Metal Dross Economy Company, of Bristol, Conn., manufacturers of devices for saving metal from skimmings, are now engaged in constructing their apparatus so that it can be used for furnaces without crucibles.

The Millinocket Foundry & Machine Company has been incorporated at Millinocket, Maine, with a capital stock of $10,000 to operate an iron and brass foundry and machine shop. Paper and pulp mill work will be carried on.

The Duplex Metals Company, 208 Fifth Ave., New York City, and rolling mills at Chester, Pa., inform us that their wire was the only one that withstood the most severe sleet storm ever experienced on the Great Northern Railroad. This wire consists of a steel core covered with copper and is used to replace solid copper wires. The storm was in the early part of February.

At a recent meeting of the directors of the Detroit Copper & Brass Rolling Mills, of Detroit, Mich., the following officers were elected: President and general manager, J. H. Jones; vice-president, R. P. Joy; assistant to the president, John R. Searles; secretary and treasurer, Wm. F. Montgomery; assistant secretary, Frank H. Hoffman; auditor, Andrew J. Peoples.

The Waterbury Crucible Company, of Waterbury, Conn., manufacturers of graphite crucibles and other graphite products are sending out to the trade their new catalogue. This catalogue is compiled in a very attractive manner and illustrated with pictures of their works and shows the manner in which crucibles are made. A list of crucible sizes with dimensions are given with the manner of measuring a crucible for comparison. A number of pages are devoted to the care and use of crucibles in order to obtain the longest life from them. This catalogue will be sent to anyone interested and will prove of much value to the crucible user.

At the annual meeting of the stockholders of the American Brass Company, of Waterbury, Conn., recently held, the following officers and directors were elected: President, Charles F. Brooker; first vice-president, Edward L. Frisbie Jr.; second vice-president, Alfred A. Cowles; third vice-president, James S. Elton; treasurer, John P. Elton; secretary, Gordon W. Burnham; assistant secretary, Lewis A. Dougherty. Directors: C. F. Brooker of Ansonia, A. A. Cowles of New York, J. S. Elton of Waterbury, A. C. James of New York, C. H. Dodge of New York, L. A. Dougherty of Torrington, J. P. Elton of Waterbury, E. T. Coe of New Haven, E. L. Frisbie Jr. of Waterbury, G. W. Burnham of New York, F. B. Kent of New York, J. J. Slocum of New York, and Edward H. Holbrook of New York.

The Sun Plating Works has moved to 32 Maiden Lane, New York City.

The Kellogg Mfg. Co. has succeeded the Wray Pump & Register Company at Rochester, N. Y., manufacturers of automobile pumps and registers.

The W. H. Stearns Stamping Company of Worcester, Mass., have moved from Beacon St., to 34 Southbridge St., in that city where larger facilities are had for manufacturing. Sheet metal stampings are made.

The Spargo Wire Cloth Company, recently organized at Rome, N. Y., with a capital stock of $50,000 to manufacture bronze and brass wire cloth, have let the contract for a building 100x200 feet in size to be used to manufacture their product.

The Oil City Brass Works has been established at 647 Main St., Beaumont, Texas, by A. Daugherty. A jobbing brass foundry will be conducted and it is stated that a specialty will be made of propellers.

The Ford Motor Company, of Detroit, Mich., manufacturers of automobiles has placed an order for 2,100 tons of vanadium steel, the largest ever placed for this material, for their 1909 cars.

The Uniform Seamless Wire Company, recently organized at Providence, R. I., to make jewelers' wire, have leased the shop at 71 Peck St., in that city. The shop will be equipped with machinery.

The California Metallic Packing Company have been incorporated at Sacramento, Cal., and are now erecting a plant for the manufacture of metallic packing for use on locomotives and other steam machinery.

John Jennings has started the manufacture of metal novelties, sterling silver goods, and hollow-ware in the Richardson Building on Green St., Newark, N. J. He was formerly president of the Jennings Silver Co., of Irvington, N. J.

According to Counsul-General Richard Guenther of Frankfort, Germany, thirteen of the largest automobile manufacturers of Germany and France have agreed not to participate in any automobile races for the year 1909. Heretofore, they say, the expenses have been too heavy in competing in such races.

The Massasoit Company has been incorporated at Chester, Mass., to take over the Massasoit Abrasive Products Company. The capital stock has been increased from $30,000 to $50,000. The manufacture of emery wheels, hones and other abrasive products is carried on.

The daily papers state that Charles Ludlow of Kingsland, N. J., "who is credited with being the originator, has discovered a process of tempering copper which it is said can be refined and made useful as a cutting tool. He has been experimenting for the last four years and has been offered as much as $25,000 by a prominent New York concern but it is expected that the copper trust will purchase the patent, application for which has been made."

The Standard Meter Company, 1434 North Randolph St., Philadelphia, Pa., manufacturers of gas meters, are to erect a new three story building, 50 x 70 feet.

The new brass foundry of the United Cigarette Machinery Company at Durmid, Va., is now in operation. Castings for cigarette machines will be made.

The Harvey Osmun Silverware Company, manufacturers of silver toilet ware, have moved from 62 N. J. R. R. Ave., Newark, N. J., to No. 64, where double the factory space is provided.

The Beler Water Heater Company has leased the building at 311 Water St., Pittsburg, Pa., and will move there. New equipment for the manufacture of water heaters will be installed.

The Wrightsville Hardware Company, of Wrightsville, Pa., are to rebuild the polishing and tinning departments of their works recently destroyed by fire and will require equipment.

The Carborundum Company of Niagara Falls, N. Y., recently received a large order for 4 tons of assorted carborundum wheels to be shipped to Buenos Ayres, Argentina and to be used in cutting marble for the National Government building.

The French mint is about to coin for the first time, 10 and 25 centime pieces (says Consul-General Richard Guenther of Frankfort, Germany,) of aluminum to take the place of copper coinage. The copper coins will be withdrawn. The nickel coins of the 25 centime denomination will not be withdrawn.

The Loxit Motor Lock Co., recently incorporated at North Tonawanda, N. Y., with a capital stock of $30,000 to manufacture locks for motor-cycles, motor-boats and automobiles, is arranging for a factory. Dr. Pemberton Lundy is the president; Geo. A. Fowler, vice-president; and Samuel J. Elliott, secretary and treasurer.

Chas. H. Besley & Co., 1512 South Clinton St., Chicago, Ill., which has been conducted as a firm for many years, has now been incorporated with a capital stock of $150,000. This company are jobbers in hardware, sheet brass and wire, brass and copper tubing and other goods of a like nature. Edward T. Wells is the general manager and has assumed charge of the business since the death of Charles H. Besley.

The Reinhold No-Flux Aluminum Solder Company was incorporated on March 6, with a capital stock of $30,000 all paid in and non-assessable. The incorporators of the company were Dr. O. F. Reinhold, Willard S. Muchmore, Geo. W. Heidrich, and H. C. Heidrich. Geo. W. and H. C. Heidrich are the proprietors of the Electrical Maintenance & Repair Company, Newark, N. J. The business of the new company is to manufacture the Reinhold no-flux solder for soldering aluminum.

The U. S. Automatic Company have been organized at North Amherst, Ohio, with a capital stock of $50,000 to manufacture screw machine products and automobile accessories.

The new factory of L. E. Waterman Co., Ltd., for the manufacture of fountain pens has been formerly opened at St. Lambert, Quebec, Canada. This is a branch of the United States plant.

An auction sale of the stock and fixtures of the bankrupt Atlas Smelting & Refining Co., of Philadelphia, Pa., smelters and refiners of scrap metals, took place on March 13th by order of P. S. Schloss the trustee.

Personal.

H. H. De Loss, treasurer of Handy & Harman left on March 13th for Japan, and will not return for several months.

Henry R. Towne, president of the Yale & Towne Mfg. Co., of Stamford, Conn., was recently unanimously re-elected president of the Merchants' Association of New York.

Reuben Hill, formerly superintendent of the Tiffany Studios at Corona, N. Y., has been made general superintendent of the Bristol Engineering Corporation of Bristol, Conn.

Alfred Martin is now representing the U. S. Electro Galvanizing Company, of Brooklyn, N. Y. The trade will receive the benefit of his extensive experience in the electroplating industry.

Henry M. Huxley, formerly with the Duplex Metals Co., of Chester, Pa., and 208 Fifth Ave., New York City, has become associated with the firm of Brown & Williams, Patent Attorneys at 1550 Monadnock Block, Chicago, Ill., and will make a specialty of metallurgical and chemical patents. A specialty will also be made of the manufacture of wire. Mr. Huxley was formerly with the American Steel & Wire Co., of Worcester, Mass.

Obituary.

Lewis J. Atwood, president of the Plume & Atwood Mfg. Co., of Waterbury, Conn., and Thomaston, Conn., died at his home in Waterbury on February 23d in his eighty-first year. He was born in Goshen, Conn., in 1827, and in connection with the late David S. Plume, built up the business to the present magnitude. The business was formerly the Holmes, Booth & Atwood Co., but was afterwards changed to the Plume & Atwood Mfg. Co. Mr. Atwood was identified with the Waterbury plant in which lamps, burners and many other forms of brass goods are made while Mr. Plume looked after the rolling mill at Thomaston. Mr. Atwood was a man of strong personality and while not closely identified with the business in the last few years was almost a daily visitor at the works. He leaves a widow and one son.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Acetone, pure, 98-99	lb.	.22
Acid, Acetic, pure, 30%	lb.	.07
Acid, Arsenious (White Arsenic)	lb.	.20
Acid, Benzoic	lb.	.55
Acid, Boracic (Boric), pure	lb.	.12
Acid, Hydrochloric, see Acid, Muriatic		
Acid, Hydrofluoric, 30%	lb.	.04
Acid, Hydrofluoric, 50%	lb.	.10
Acid, Muriatic, 20°	lb.	.02
Acid, Muriatic, c.p., 20°	lb.	.07
Acid, Nitric, 38	lb.	.05⅝
Acid, Nitric, 40	lb.	.05⅞
Acid, Nitric, 42°	lb.	.06¼
Acid, Nitric, c.p.	lb.	.08
Acid, Sulphuric, 66	lb.	.01¾
Acid, Sulphuric, c.p.	lb.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	lb.	.04
Aluminum, Sulphate	lb.	.06
Aluminum, Metallic, in ingots	lb.	.24
Aqua Fortis, see Acid, Nitric		
Ammonia Water (Aqua Ammonia), 20	lb.	.04¾
Ammonia Water (Aqua Ammonia), 26	lb.	.06¼
Ammonia Water, c.p.	lb.	.08
Ammonium Carbonate, lump	lb.	.15
Ammonium Chloride (Sal-Ammoniac)	lb.	.12
Ammonium Hydrosulphuret	lb.	.30
Ammonium Sulphate	lb.	.07
Ammonium Suphocyanate	lb.	.50
Amyl Acetate	gal.	1.85
Antimony	lb.	.08
Antimony Chloride (Butter of Antimony)	lb.	.23
Arsenic, Metallic	lb.	.15
Arsenic, White (Acid Arsenious)	lb.	.20
Argols, White (Cream of Tartar)	lb.	.31
Asphaltum, Commercial	lb.	.05
Asphaltum, Egyptian (Bitumen)	lb.	.30
Benzine	gal.	.20
Benzol, Pure	gal.	.75
Bismuth, Metallic	lb.	1.75
Bitumen, see Asphaltum.		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	lb.	.10
Borax Glass	lb.	.35
Cadmium, Metallic	lb.	.75
Carbon Bisulphide	lb.	.10
Calcium Carbonate (Precipitated Chalk)	lb.	.10
Chrome Green	lb.	.50
Copper, Casting (cask)	lb.	.13⅛
Copper, Casting (carload)	lb.	.12¾
Copper, Electrolytic (cask)	lb.	.13⅛
Copper, Electrolytic (Carload)	lb.	.12¾
Copper, Lake (cask)	lb.	.13½
Copper, Lake (carload)	lb.	.13
Copper Acetate (Verdigris)	lb.	.35
Copper Carbonate, dry	lb.	.25
Copper Sulphate (Blue Stone)	lb.	.09
Copperas, see Iron Sulphate.		
Corrosive Sublimate, see Mercury Bichloride.		
Cream-Tartar, see Potassium Bitartarate.		
Cryolite	lb.	.12
Cyanide, see Potassium Cyanide.		
Dextrin	lb.	.15
Emery Flour	lb.	.04
Emery, F F & F F F	lb.	.03
Flint, powdered	lb.	.01
Fluor Spar	lb.	.01¼
Fusel Oil	gal.	1.75
Gelatine, Nelson's	lb.	1.15
Gold Chloride	dwt.	.60
Gum Copal	lb.	.30
Gum Damar	lb.	.30
Gum Elemi	lb.	.70
Gum Guiacum	lb.	.26
Gum Mastic	lb.	.70
Gum Sandarac	lb.	.35
Gum Shellac, brown	lb.	.50
Gum Shellac, white	lb.	.60
Iron Perchloride	lb.	.25
Iron Sulphate (Copperas)	lb.	.05
Lead Acetate (Sugar of Lead)	lb.	.15
Lead, Pig	lb.	.04
Lead, Red	lb.	.12
Lead, Yellow Oxide (Litharge)	lb.	.12
Liver of Sulphur, see Potassium Sulphide.		
Manganese, Ferro, 80%	lb.	.10
Manganese, Metallic, pure	lb.	.75
Magnesium, Metallic	lb.	1.25
Mercury Bichloride (Corrosive Sublimate)	lb.	.93
Mercury, Metallic (Quick Silver)	lb.	.89
Mercury Nitrate	lb.	1.50
Mercury Oxide, yellow	lb.	1.80
Nickel and Ammonium Sulphate (Double Salts)	lb.	.16
Nickel Carbonate, dry	lb.	.60
Nickel Chloride	lb.	.50
Nickel, Metallic	lb.	.47
Nickel Sulphate (Single Salts)	lb.	.25
Nitre (Saltpetre), see Potassium Nitrate.		
Oil, Palm	lb.	.08
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	lb.	.15
Pearlash, see Potassium Carbonate.		
Phosphorus, yellow	lb.	.40
Phosphorus, red	lb.	1.10
Pitch	lb.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	12.50
Platinum, Metallic	oz.	23.50
Potash by-Alcohol, in sticks	lb.	.50
Potash, Caustic (Potassium Hydrate)	lb.	.08
Potassium Bichromate	lb.	.14
Potassium Bitartarate (Cream of		
Potassium Carbonate (Pearlash)	lb.	.10
Potassium Chlorate	lb.	.15
Potassium Cyanide	lb.	.25
Potassium Iodide	lb.	2.25
Potassium Nitrate (Nitre or Saltpetre)	lb.	.10
Potassium Permanganate	lb.	.17
Potassium, Red Prussiate	lb.	.60
Potassium, Yellow Prussiate	lb.	.24
Potassium Sulphide (Liver of Sulphur)	lb.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	lb.	.70
Tartar)	lb.	.31
Pumice, Ground	lb.	.05
Quartz, Powdered	lb.	.01
Rosin, Yellow	lb.	.04
Sal-Ammoniac, see Ammonium Chloride.		
Sal-Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Fine	oz.	.50¼
Silver Nitrate, crystals	oz.	.50
Soda-Ash	lb.	.05
Silver, Fine	oz.	.50⅝
Sodium Biborate, see Borax.		
Sodium Bisulphite	lb.	.15
Sodium Carbonate (Sal-Soda), crystals	lb.	.02
Sodium Hydrate (Caustic Soda)	lb.	.05
Sodium Hydrate (Caustic Soda) by Alcohol (in sticks)	lb.	.45
Sodium Hyposulphite ("Hypo")	lb.	.04
Sodium, Metallic	lb.	.90
Sodium Nitrate	lb.	.05
Sodium Phosphate	lb.	.09
Sodium Silicate (Water-Glass)	lb.	.04
Soot, Calcined	lb.	.15
Spelter, see Zinc.		
Spermacetti	lb.	.40
Sugar of Lead, see Lead Acetate.		
Sulphur (Brimstone), in lump	lb.	.05
Tin Chloride	lb.	.45
Tin Metallic	lb.	.28⅝
Turpentine, Venice	lb.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water-Glass, see Sodium Silicate.		
Wax, Beeswax, yellow	lb.	.45
Wax, Carnauba	lb.	.70
Wax Japan	lb.	.20
Whiting (Ground Chalk)	lb.	.02
Zinc Carbonate, dry	lb.	.10
Zinc Chloride	lb.	.12
Zinc Sulphate	lb.	.08
Zinc (spelter)	lb.	.04⅞

THE

BRASS WORLD

AND

PLATERS' GUIDE

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A MONTHLY JOURNAL

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Danger of an Oxidizing Flame in Melting with Oil.

The rapidly extending use of oil for melting brass has resulted in the discovery that the difference between an oxidizing and reducing flame is not well understood in the brass foundry trade. It is but natural, of course, that the use of a new melting agent should reveal new obstacles, and as far as we have been able to discern, the use of an oxidizing flame in melting with oil is the one most commonly encountered in brass foundries which install oil melting furnaces for the first time. It is a simple matter to obtain a reducing flame in an oil burner, and all that is required is to adjust the relative proportions of air and oil; but the brass founder, apparently from a lack of understanding of the meaning and function of these two flames often fails to understand the matter when the furnace expert who installs the furnace and leaves it running in good order has departed from the foundry.

Ore smelters well know the difference between a reducing and an oxidizing flame, as it is the fundamental principle of the smelting and refining of ore. In the refining of copper, for example, an oxidizing flame is first used for oxidizing or burning out the impurities in the metal, and then, when the has been done, a reducing flame is used to reduce the oxide of copper also formed when the other impurities are oxidized and slagged off. The intelligent maintenance or production of these two opposite flames is absolutely necessary or the copper cannot be refined. In the melting of brass, however, the reducing flame only must be used, and it is this flame and this alone which determines the success in melting. To use an oxidizing flame means oxidizing the metal with its accompanying evil of waste and bad castings.

By an oxidizing flame is meant one in which there is an excess of air (which contains oxygen) in it. When such a flame is used the metal is oxidized while the melting is going on. In principle it is like blowing air on molten metal. To be sure, such a flame has an excellent appearance as it means the complete combustion of the oil, but it is theoretically wrong for use in melting. The failures in the use of oil furnaces are almost entirely due to this one feature and yet it is an exceedingly simple matter to avoid it.

A reducing flame is one which contains carbon or hydrocarbons (from the oil) in excess of the air. A simple oil flame burned without a blast is a strong reducing one. Wherever there is smoke, which is caused by unconsumed carbon, the flame is reducing in nature. In order to obtain heat, however, it is necessary to have combustion, and the smoky flames do not produce the necessary heat. To aid this combustion a blast of air is required. By its use with the oil, it is possible to obtain anything from a smoky flame to one of a strongly oxidizing nature.

The ideal condition in melting metals with oil is to obtain a flame that is not oxidizing and have a sufficiently complete combustion of the oil to prevent smoke. It is far better, however, to err on the smoky side than on the oxidizing one. The whole question resolves itself into the relative proportion of air and oil supply, and if the melters could or would understand the danger of the oxidizing flame, and the great value of one which has a reducing action, oil furnace manufacturers would have less to annoy them. It is so easily accomplished by adjusting the air and oil valves that we advocate more stress being laid upon this point by furnace manufacturers during the installation and proving of the furnace.

Disadvantages of Leaving Work in the Bottom of a Nickel Tank.

It is not an uncommon thing to find a large amount of small articles in the bottom of a nickel plating tank, and which have fallen from racks or wires while being plated. In some establishments where a large quantity of work is done, a bushel or more has been known to accumulate in the tank although this would seem to show the utmost laxity in attention. While articles may fall into other kinds of plating solutions, they are easily seen and are at once removed. In nickel solutions, however, the sediment in the bottom of the tank prevents the articles from being seen and thus they accumulate.

Brass or copper articles, or those which have been brass or copper plated, are particularly injurious in a nickel plating solution as they slowly dissolve and contaminate it. Both copper and zinc cause nickel deposits to blacken. It is undoubtedly a fact that many nickel solutions give dark colored deposits on this account.

Iron or steel articles are not as injurious although they are more readily dissolved. While a small quantity of iron does not injure a nickel deposit, a large quantity causes it to become hard and brittle and finally peel. It is obvious that it will pay a plater to see that there are no articles in the bottom of his tank.

Spring wire made of 10 per cent German silver is now being used for the manufacture of hat pins in place of steel. It is particularly good for use on metallized roses used for this purpose as it is easily soldered and may be plated in the acid copper solution directly.

Battery zincs are amalgamated either by applying mercury to the surface while the zinc is immersed in a weak sulphuric acid pickle, or by the addition to the molten zinc before casting the zincs. This addition of mercury to the molten zinc has been found to give much better results than surface amalgamation and is now extensively practiced. About 3 per cent of mercury is added to the molten zinc. The operation is an unhealthy one, but is carried on in the manufacture of battery zincs.

Plaster of Paris Molds and the Method of Casting Metals in Them.

Everyone is familiar with plaster of Paris, and its value in taking impressions of objects is well appreciated. While waxes, gutta-percha and other similar substances may be used for taking an impression, they cannot be used for purposes where plaster of Paris is employed. This material is very extensively used for making articles of all descriptions, and its cheapness together with the accuracy, sharpness and smoothness of the impression gives it properties possessed by no other substance.

The property of hardening and taking the finest impression has always been an attractive feature to anyone who desired to make fine castings. The surface of a plaster mold may be made as smooth as that of a steel die and one naturally believes that the castings will be likewise. Unless a thorough knowledge of the art of casting in plaster of Paris molds is possessed, failure will result. There is no class of molding which requires such care and intelligence.

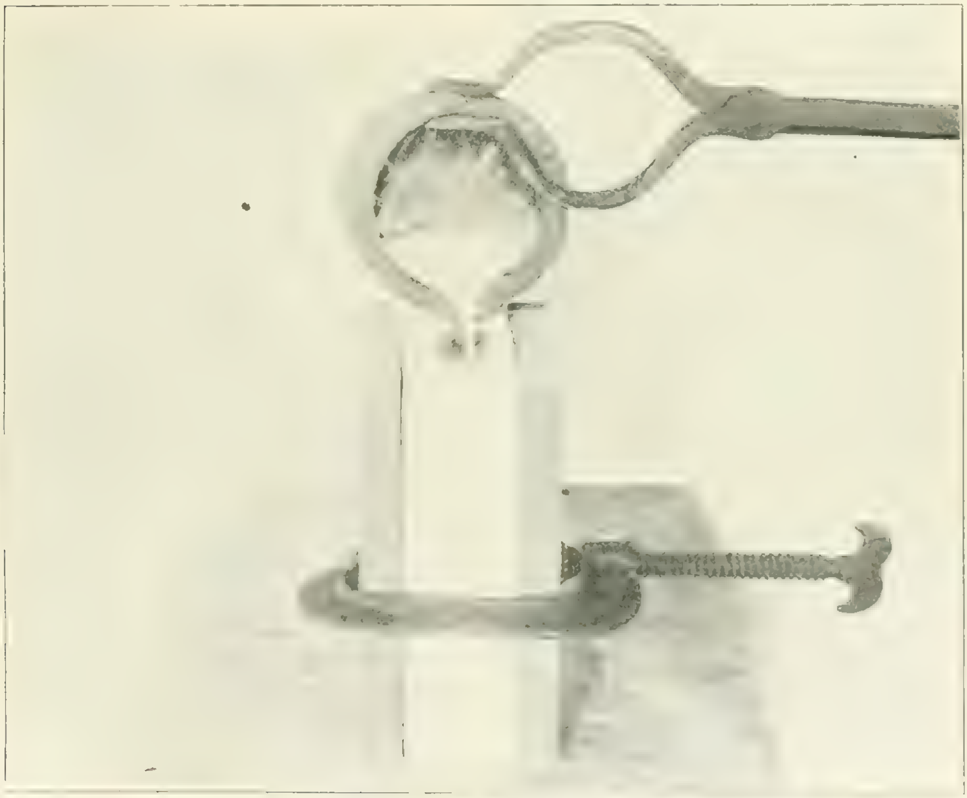


Fig. 1. Method of Pouring a Plaster Mold with a Small Crucible.

It may be said that plaster of Paris occupies a place in molding which no known substance can fill. Its value, of course, lies in the fact that it changes from a liquid to a solid condition after having been mixed with water and allowed to stand for some time.

Appearance of Plaster Molds.

The ordinary observer greatly over rates the value of plaster of Paris molding. The fact that an excellent impression can be obtained from the pattern does not mean that nothing more is needed. The taking of the impression is really the simplest part of the whole process.

The cost of casting in plaster molds is high and the only object of using them is to obtain the most detail and smoothness that any casting process will admit. Beyond this there is nothing gained. The disadvantages of casting in plaster, however, are so great that its use is now confined to work which will warrant the expenditure of the time and money in making the molds. There are, however, many uses for castings made in them and the process is more or less extensively employed. Those who contemplate using it, must first question whether it will pay, as there are many instances in which French sand may be used to obtain results which will answer equally as well and at a much less cost and saving in time. Even the most expert molder in French sand, however, cannot obtain as smooth work in his sand molds as that produced in plaster. Good plaster work will result in castings which have the appearance of having been cast in polished metal molds or produced from sheet metal in a steel die.

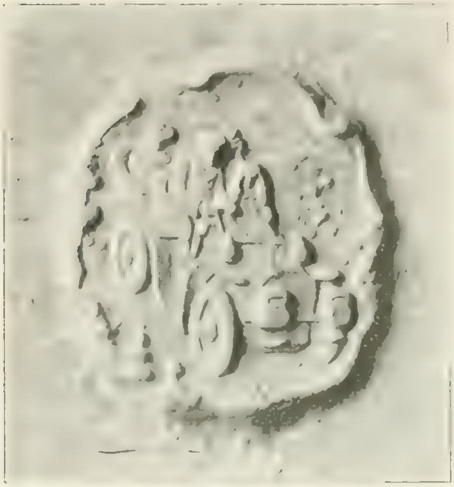


Fig. 2. The Pattern Used.

Plaster of Paris.

Plaster of Paris is made from gypsum, a mineral found in various parts of the world. Large gypsum deposits occur at Windsor, Nova Scotia, from which a considerable portion of the supply is drawn. The mineral is white and readily cut with a knife. In fact, it is really natural plaster of Paris, as the method of converting it into this substance is to heat it to drive off practically all of its water. When this calcined material is again mixed with water it hardens and once more becomes gypsum.

There is much difference in the quality of plaster of Paris sold on the market. The large demand for it is in the making of walls in dwelling houses, and for such work a particularly fine grade of plaster is unnecessary. The majority of plaster of Paris found on the market is used for such a purpose and cannot be relied upon for fine work. Now and then it is possible to obtain some of excellent grade from dealers in building supplies, but again it will be full of grit and lumps. The difference in cost between the good and poor is so slight that it is poor policy to attempt to economize. The cost of the plaster in a mold is so small and the labor so high that the price of the material is of little importance. For many uses ordinary plaster of Paris will be found suitable.

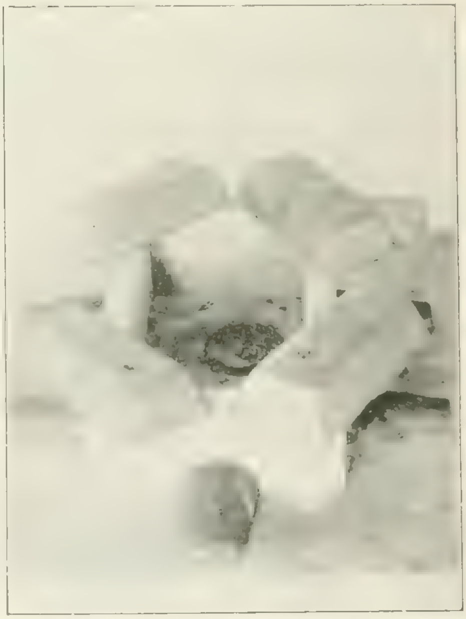


Fig. 3. Manner of Setting the Pattern and Weighting.

and if it is possible to obtain it locally from dealers in building materials, it is the good fortune of the consumer; but he should ascertain whether it is capable of giving the desired results. Those who desire the finest impression and to take no chance on the quantity of the plaster should employ the so-called "Dental-Plaster."

Dental Plaster of Paris

Dental plaster of Paris is made by carefully burning selected gypsum and then finely grinding and bolting it to remove any grit or coarse material. It is simply a good grade of plaster finely and evenly ground. Its cost is considerably more than ordinary plaster, but when the sharpest impression is desired, as it is in dental work, it must be used as ordinary plaster is not sufficiently fine. Dental plaster costs about $4.50 per barrel, but smaller quantities can be obtained at a slightly increased cost. Small amounts usually sell for from 10 to 15 cents per quart, and can be obtained in tin cans which protect the plaster from moisture.

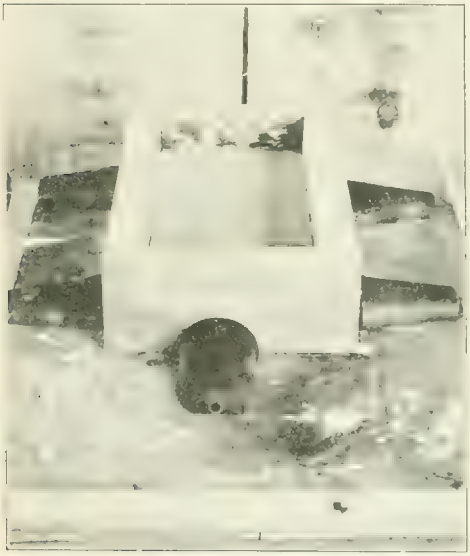


Fig. 4. The Nowel after Casting.

The Pattern.

The pattern used for casting in plaster of Paris may be of any desired material that water will not effect. If wood, it should be well varnished to protect it. Whatever is used, however, must be well made so that the draft will be ample. In molding in sand, the pattern may be rapped to loosen it so that portions which are deficient in draft may easily be removed. It is not so in plaster work as there is no opportunity for rapping. The pattern must leave it very freely. Sharp edges are easily broken off and in making a pattern they should be avoided wherever possible.

Metal patterns or any other material from which plaster can be removed when hardened may be employed. In Fig. 2 is shown the pattern used for illustrating this article. It is modeled in wax and plaster easily leaves it. The molder will, of course, have to use what is furnished him, but let it be understood that it is useless to attempt to mold in plaster unless the pattern is suited for it.

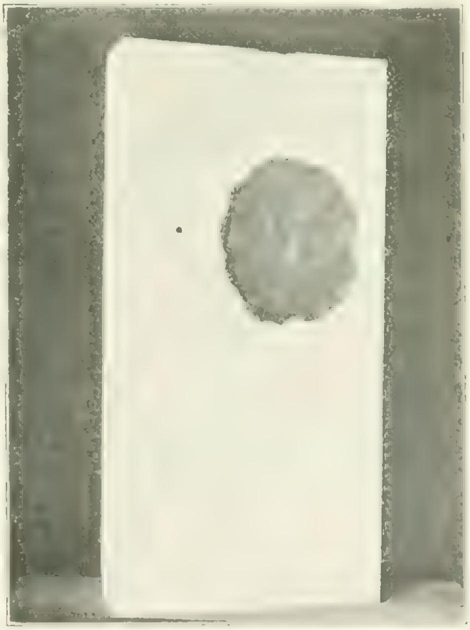


Fig. 5. Face of Nowel after Casting.

Preparing the Plaster

For casting soft metals with a low melting point, such as solder, britannia metal or pewter, the plaster of Paris is used without mixing anything with it. But when the high melt are metals like silver, gold, bronze or their alloys are to be cast, it is necessary to use some substance with it to prevent the fusing and cracking of the mold when the hot metal is poured into it.

The materials used for mixing the plaster are numerous: Asbestos, fire-brick dust, clay, coal ashes, and silica. The asbestos, however, seems to give the best results as its fibrous nature is capable of holding the mold together. Fire brick has long been used for this purpose, and in 1906 a patent was granted to Joseph G. Wever, of Providence, R. I., for the mixture of hard coal ashes and plaster of Paris. Mr. Wever was at one time a plaster molder with the Gorham Mfg. Co., of that city, and with his plaster mixture turned out samples of cast work equal to those made in plaster. Owing to the fact that the use of asbestos and plaster of Paris is patented, the use of materials other than asbestos would seem to be the result of a desire to evade the patent.

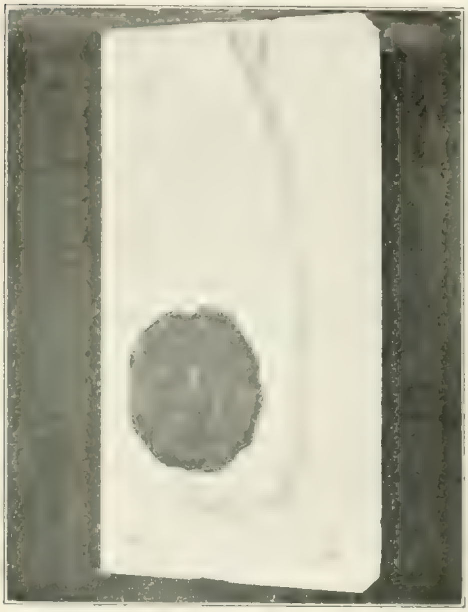


Fig. 6. The Nowel after Cutting Gate and Countersinking for Pins.

The use of the mixture of asbestos and plaster of Paris for making molds for casting metals was patented on Jan. 16, 1894, by Eugene C. Smith, of Providence, R. I. (U. S. Patent 512,850), and is now owned and used by the Gorham Mfg. Co., of the city, the large manufacturers of silver and bronze wares. It will be seen that the patent has only about one and a half years more to run (the life of a patent is seventeen years). As this patent specification seems fundamental and contains much information about molding the plaster, it is deemed advisable to give the portions that are of value. They are as follows:

"The object of the invention is the production of a mold for casting metals, by means of which the most delicate outlines and designs of a finely hand wrought pattern can be perfectly reproduced in a mold taken from such a pattern. A mold for this purpose should resist exposure to the heat necessary for drying it, and also the heat of the melted metals poured into it, without being fractured or cracked. At the same time, such molds should be porous enough to admit a free escape of the gases usually generated by fluid metals.

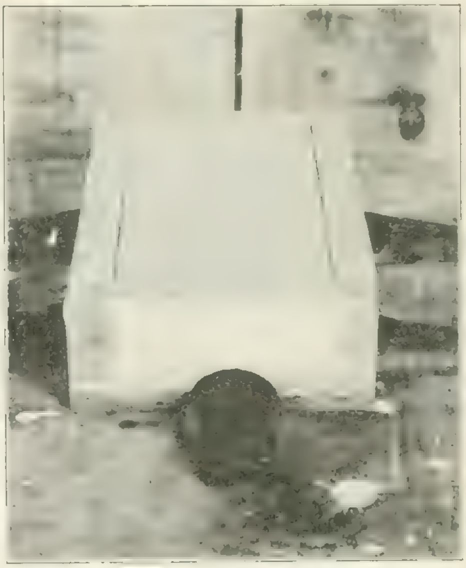


Fig. 7. The Cope after Casting.

My invention consists of a mold composed of plaster of Paris and non-melting fiber, such as fiber of asbestus.

I carry out my invention in the following manner:—Fine, short asbestus fiber or pulp is mixed with water to about the consistency of a thick, creamy, but still flowing, mass, being well stirred and mixed. I then mix plaster of Paris with water in the usual way known to those skilled in the working of plaster. To two parts of this plaster mixture, I add about one part of the asbestus mixture. Both are then well stirred together to form a uniform mass which is applied to, and cast on, the pattern from which a mold is to be taken, in substantially the same manner as in making a plaster mold. The making of the second half or other parts of a mold is performed in the same manner as above. When I have formed my molds as stated, I place them in a drying oven and expose them to a moderate heat, say 250° to 300° Fahrenheit, for about ten to twelve hours more or less so as to evaporate the greater portion of the moisture and render the molds at least apparently dry. Then I slowly increase the heat to about 1,000° or a low red heat, and retain this heat for two or three hours, more or less, when I let the molds cool off slowly. They are then ready to receive the casting.

By the foregoing means, I produce a perfect mold in every respect; practically useful for producing small sharp castings, also castings of considerable surface but very thin and light in body.

"Furthermore with my invention, I obtain a material for molds of sufficient strength to permit the use of elastic rubber patterns having many deep and fine undercuts in their designs. The elastic patterns can be drawn from a mold made of my composition without breaking away the deep undercuts in the design. This cannot be done by any other process of molding known to me. Molds made of my composition of plaster of Paris and asbestus fiber can be used for casting metals in them with most satisfactory results.

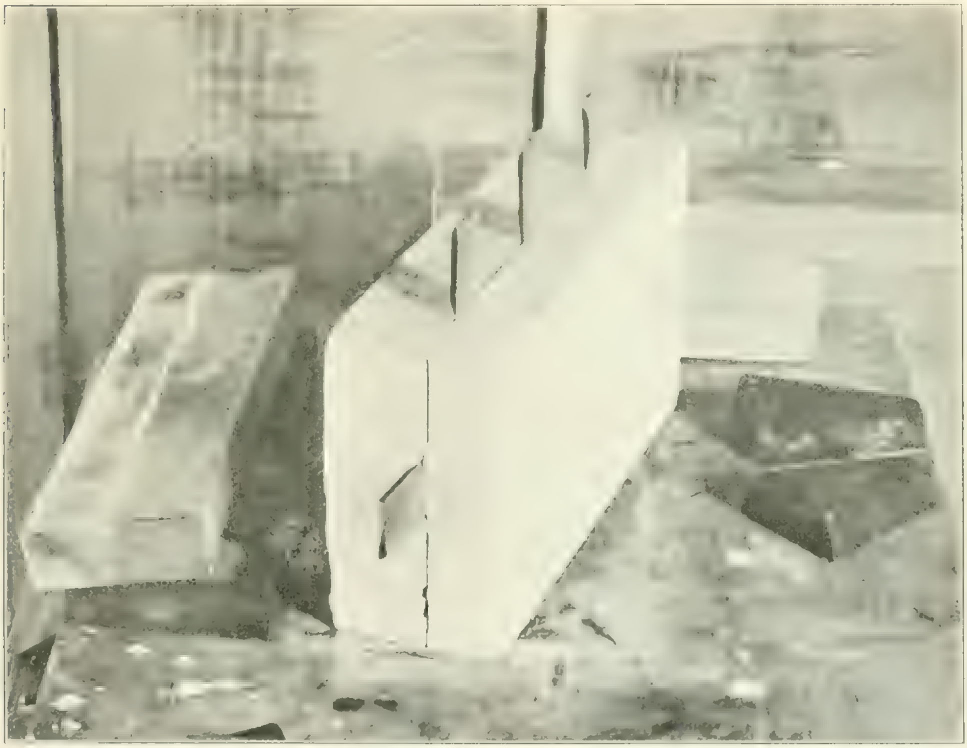


Fig. 8. Manner of Separating the Cope and Nowel of a Plaster Mold

either by pressure applied to the fluid metal by some one of the known patented contrivances, or by means of simply pouring the metal into my mold as is done ordinarily in using sand or loam molds.

"If my molds are to be filled with metal by pressure, the heat for drying them is not brought to so high a degree, but when the metal is to be poured, as in the ordinary way, of casting metal, my molds must be rendered perfectly free from moisture and the sulphur and crystallization water contained in the plaster, which can only be fully removed by a low red heat.

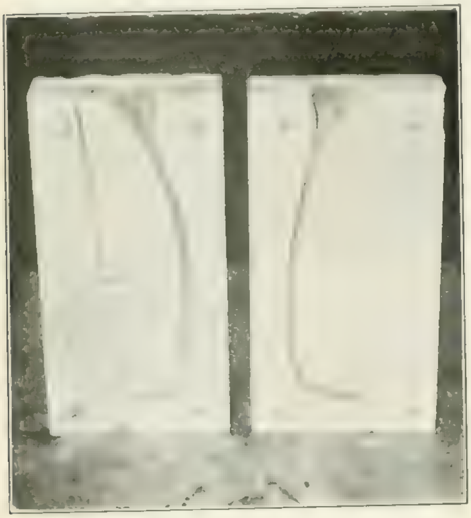


Fig. 9. The Cope and Nowel Ready for Closing.

"All other combinations of plaster and other materials which I am aware of for making molds could not resist exposure to a low red heat without cracking and crumbling into pieces.

"The manner in which I make my molds is simple but efficient.

"In order to convey a clear idea of the novelty and utility of my invention, I will here state a few facts concerning the use of molds made of plaster of Paris mixed with sand, burnt clay dust or ashes (in the ordinary manner) into which fluid metals such as britannia, zinc, brass (or other meals into which copper enters largely) sterling silver or gold could be cast successfully. For a practical useful mold such compositions could be used only for metals melting at a low degree of heat.

"It is well know by those skilled in the art of casting metals, that metals even those melting at as low a heat as 600° Fahrenheit cannot be cast successfully and sharp in a plaster of Paris mold, or the compositions mentioned, unless the fluid metal is forced into the mold by pressure. Such mechanical pressure is indispensable if the mold is of pure plaster, or the compositions above mentioned, because a mold made of such compositions will not stand the heat required to expel all moisture and suphuretted crystallization water contained in the plaster without cracking and crumbling to pieces. Therefore, mechanical pressure must be applied to overcome counteractions of gases and vapors generated by the heat of the fluid metal.

"The above only applies to metals melting at a low heat. Metals melting at a high heat, say, 1,000° to 2,000°, cannot be cast in plaster molds, or molds made of the mentioned compositions, even with mechanical pressure because the heat of the metal acts on the fine surface of the mold and destroys it. Consequently a rough casting is the result.

"I may here make a few explanations concerning molds made of pure plaster, or mixtures of sand, ashes, loam, &c., with plaster. It is well known that the crystallization of a portion of the water, used in the mixing of ground calcined plaster, gives it the property of setting, or hardening into a solid mass. It is also known that this water of crystallization cannot be fully expelled from the plaster until about 800° or 900° Fahrenheit are applied, but when subjected to this heat the plaster cracks and crumbles in pieces. In order to overcome this trouble resort has been had to the mixture of sand, brick-dust, ashes, &c., with the plaster to produce a mold that would stand the heat necessary for expelling the water of crystallization and sulphur in the plaster and render it fit to receive metal castings that melt at a high heat. I have made a great many experiments with such mixtures with plaster for molds but never met with satisfactory or practical results nor has any one else to my knowledge.

"In order to give an idea of the novelty and utility of my invention, I wish to state that it has been aim of founders and artisans to use molds made of plaster, or compositions of thes ame for costing metals, especially brass, bronze, German and sterling silver, gold, &c., because the most delicate outlines and design of a given pattern can be more accurately and sharply reproduced in a plaster mold, than in a mold made of sand or loam.

"I am fully aware that metals melting at a low degree of heat are cast in pure plaster molds. Such metals as type-metal, tin, britannia, and zinc have been cast in plaster molds with success, but the metal had to be forced into the molds by mechanical pressure. Sterling silver and some low melting brass compositions have been cast in plaster molds by pressure but the results with these metals were never satisfactory or practical, even though cast under pressure. The molds could not withstand the heat necessary to dry them perfectly and effectually. Consequently they cracked when the red-hot metal was injected. They also became soft and the pressure on the metal caused it to penetrate into the mold, producing a rough casting and obliterating all fine outlines and design.

"By using the mixture of plaster of Paris and asbestus as specified, I produce a strong and fine mold and one which will answer all purposes such as withstanding heat, pressure, &c.

"The short fine fiber holds the plaster together and its fire proof qualities enables the mold to stand the heat necessary for drying without cracking or crumbling. This composition yields a mold into which I can pour the metal the same as in a dry sand mold. The metal lies perfectly to the surface of the mold and produces a casting as perfect in every detail as the original patterns.

"A mold made and burned in the manner described, retains all the most delicate outlines and the material being such a poor conductor of heat the metal does not chill rapidly; consequently very thin castings of considerable surface can be made to perfection.

My molds can also be filled with metal forced in by pressure and produce better castings in every respect than with molds made of plaster, or mixtures of sand, ashes, &c., with plaster."

Carrying out the Molding.

The method of molding is as follows. The pattern is laid down upon a marble slab which has been oiled well and then the excess wiped off. A marble slab cannot be excelled for the work as it is flat and does not rust. Four pieces of wood are placed around the pattern as shown in Fig. 3. The joints on these pieces should be square and they should set flat upon the marble. It is unnecessary to have a "air-tight" fit, but unless the pieces have been well made, the plaster will run out where the joints are situated.

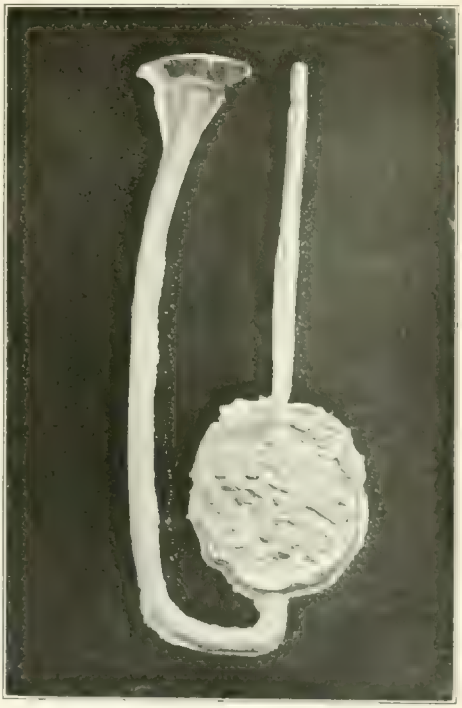


Fig. 10. The Casting as Made in the Plaster Mold.

The pieces should be the width of the cope and nowel so that the plaster may be cast in them during both operations. Their width should be enough to give a good thickness to the cope and nowel. If these are too thin they are apt to break when clamped together. If too thick, they consume too much time in drying. From 2 to 3 inches is a good thickness for small work. Large castings, of course, require a greater thickness.

Weights are now placed around the sides of the pieces of wood and across the corners as shown, in order to hold them in place while the plaster is being poured. The whole now has the appearance shown in Fig. 3. If the pattern is metal or of any other hard substance, it should be rubbed over with a cloth and a very little oil. Just enough to leave a thin film. This prevents the plaster from adhering. The mold is now ready for casting.

Mixing the Plaster and Asbestos

If asbestos is used it must be fine. Asbestos with long fibres will not answer. When suitable for use, it has the appearance of snow, so it will easily mix with the plaster to a consistency that will take the finest impression. Fibrous asbestos will not allow a sharp impression. The proportions of plaster and asbestos depend upon the metal to be cast:

For Soft Metals

Plaster of Paris	2 parts
Asbestos	1 part

For Gold, Silver or Bronze

Plaster of Paris	2 parts
Asbestos	1 part

For German Silver, etc.

Plaster of Paris	1 part
Asbestos	1 part

The higher the melting point of the metal the greater the quantity of the asbestos needed.

An enamelled iron kettle or pan is a good article for mixing the plaster. A sufficient quantity of water is poured into it, and the plaster put in with the hand and thoroughly mixed with the water. Under no circumstances pour the water on the plaster as it will ball up and harden prematurely. The asbestos can be added after each addition of plaster so that the proportions may be maintained.

When enough plaster has been added, as may be ascertained by the whole becoming slightly thick, a medium stiff brush is dipped into the plaster and the face of the pattern brushed over with it. This will prevent the formation of air bubbles on the face of the mold (one of the difficulties encountered in plaster molding) and allow the formation of a perfect impression.

The plaster is now well mixed in the water with the hand and poured into the mold. The mold should be filled quite full so that afterwards the top may be scraped off level. It is unnecessary to say that the marble slab upon which the casting is made must be levelled before the plaster is poured on it. The plaster is allowed to set and when this has taken place and the mold is soft, the top is scraped level by a strip of steel. The pieces of wood may also be removed. If they are given a coat of shellac varnish previous to using, the plaster does not adhere to them athough they may be used without any varnish if desired. They are readily detached from the plaster. Plenty of time should be allowed for the mold to set. This takes an hour or two so that it becomes good and hard. The nowel when cast has the appearance shown in Fig. 4.

Casting the Cope

When set, the nowel is removed from the marble slab. The pattern will usually come up with it, but if not, care should be taken in lifting it up. Should the pattern leave the plaster, it is placed in it again. The face of the nowel after casting has the appearance shown in Fig. 5. Four holes are now bored in each corner for making parting pins. A countersink is useful for this purpose although a knife may be used. The holes are left tapering as shown. The gate is also cut. It is better to run the gate at the bottom as shown, as this serves to force all the air out. A vent is taken off the top of the pattern to allow the air to escape. When these operations have been done, the face of the nowel has the appearance of Fig. 6.

The nowel is now placed in a pail of water and allowed to soak until no more will be taken up. This is to prevent the cope from sticking to it. The face is allowed to dry off before placing on the slab again. When this has been done, it is again laid on the marble but face up. The pieces of wood are again placed around it and the plaster mixed as before. It is then poured on the face of the nowel and the mold filled. The soaking of the nowel in water will prevent the two from sticking together after casting. When the cope has been cast the mold has the appearance shown in Fig. 7.

The cope is allowed to set for an hour or so and then the pieces of wood are removed and the mold placed on its side. Thin wedges of hard wood are now driven into the joint and very lightly. The halves of the mold will then readily come apart. A table knife is also used. In Fig. 8 the manner of applying the wedges is hown. The gate is now cut in the cope and the faces of the cope and nowel have the appearance of those in Fig. 9. The manner of making the pins on the mold may also be seen. By countersinking the holes in the nowel, tapering pins are formed in the cope. These serve to fit the halves together when they are ready for casting. The mold is now ready for drying.

Drying.

The quantity of water taken up by the plaster can readily be appreciated by those who make the mold. Before the mold can be used it must be driven out. The theoretical quantity of water necessary to set plaster is 18 per cent of its weight, but in practice from 30 to 35 per cent is generally used. In other words, one third of the weight of the mold is water.

The drying of the plaster is done in an oven. At first it should be mild. From 250 to 300 degrees F., is suitable and can be obtained from steam under pressure by placing a coil in a closed sheet iron box, but usually a small core oven or similar arrangement is employed. A thermometer should be used to indicate that the heat is not too high or the plaster will dry too rapidly. The drying consumes from 12 to 24 hours, depending upon the size of the mold and the heat. When the mold is apparently dry it is further heated to about 1,000 degrees F., or a low read heat, for two or three hours and then allowed to cool when it is ready for casting.

Casting.

The plaster molds now dried should not be allowed to remain in the air long when cool as they readily absorb moisture. The best method is to keep them warm until just before using.

The cope and nowel are now placed together and two pieces of wood nailed to the backs. The mold is then held together by a clamp. The casting is done in the regular manner.

The metals which cast the best in plaster molds are those which give off no smoke. Yellow brass is unsuited for this purpose and is never used. When bronze is used it should contain very little zinc. The pouring operation is shown in Fig. 1, while in Fig. 10 is the finished casting. There are always more or less fins around the edges, but these are readily trimmed off. It is very difficult to make a casting which is free from them.

Casting Soft Metals

One of the uses of plaster of Paris molds is in casting soft metals like britannia or pewter. Although the admixture of some alloy with the plaster gives better results in casting than the [illegible], it is not imperative [illegible] should be employed, as good castings may be made in the straight plaster of Paris. In [illegible] with the casting of britannia metal in plaster [illegible] [illegible] successfully with the Reed & Barton Co. [illegible] Taunton, Mass., [illegible] that the [illegible] mold be coated over with Japan [illegible] to make a [illegible] all the details

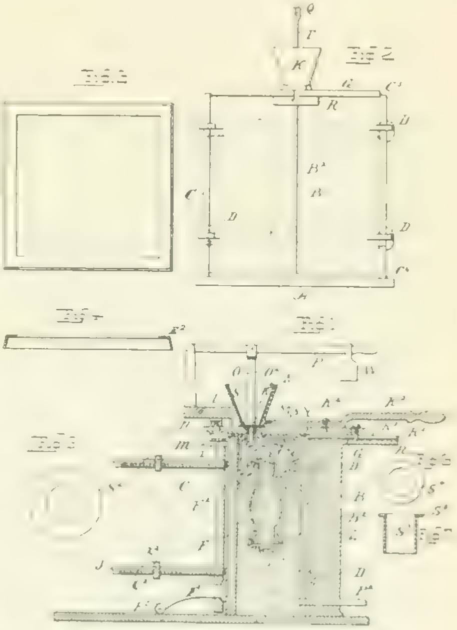


Fig 11 The Smith Vacuum Casting Apparatus.

thinner and cleaner than when in a mold without it. This method of casting has been patented (U. S. Patent 697,972, Apr. 22, 1902).

Use of Rubber Patterns.

Soft rubber patterns are used for casting in plaster of Paris molds, as they allow the use of undercut work. The patterns are molded in the usual manner and then pulled out of the mold. The pliability of the rubber allows it to be drawn out without tearing the mold. They have their limitations, however, although useful for work of an undercut nature that is to be made continuously. If only one casting is to be made, soft gelatine patterns are better. They are easily made.

Casting in a Vacuum

One of the features of making fine work in plaster molds is casting in a vacuum. This process is really the one which made plaster casting so successful as it enables one to make articles of the finest detail. Pressure casting requires difficult apparatus, but in the vacuum process, the mold is placed inside of a tight cast iron box B shown in Fig. 11. A pipe P leads to a pump for exhausting the air. The casting is shown by U and the plaster by Z. The metal is placed in the hopper K and closed by the valve stem O. The air is exhausted and then the stem O lifted up, allowing the metal to be sucked into the most delicate portions of the mold. In this manner leaves and the thinnest possible castings may be produced.

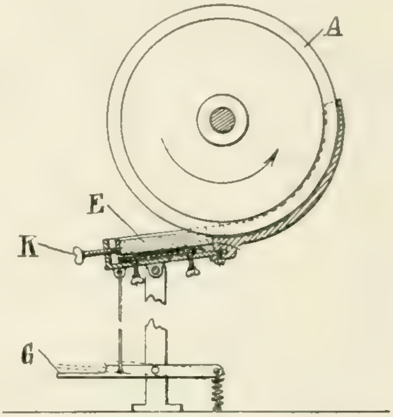
This vacuum process was likewise patented (U. S. Patent 526,874, Oct. 2, 1894), by J. J. C. Smith, of Passaic, N. J., and Eugene C. Smith of Providence, R. I. It has, therefore, about two more years to continue in force.

Cost of Molding.

The cost of plaster molding is excessive when compared with sand molding, as so much time is consumed in making the mold. When one mold is to be made and with few facilities for doing it, the cost will be found very high. In establishments where it is done with the best of facilities, the cost is supposed to be in the neighborhood of fifty cents per pound, although this figure is much too low for the majority of small work.

A Device for Applying Rouge or Tripoli to Buff Wheels.

A device for applying rouge, tripoli or other composition to a buff wheel has been patented by Frank M. Levett of the Levett Mfg. Co., of Matawan, N. J. The device is herewith shown. The buff wheel A has a trough-shaped apparatus below it in which the composition to be applied is held in place by the thumb-screw K. The composition is shown by E. A treadle G is connected to the composition holder by a rod so that when the buffer presses it with his foot, the composition bar is forced against the wheel. In this manner the hands are free and allow the buffer to do a greater amount of work. It also allows the polishing composition to be applied evenly and without labor, or without the loss of it in the exhaust pipe as frequently happens when the stick is applied by hand and is pulled away by the buff wheel.



Device for Applying Rouge to Buff Wheels.

Clay-lined graphite crucibles are now extensively used in the manufacture of special steels, particularly for electrical work. It is possible by the use of such crucibles to prevent the steel from taking up carbon from the graphite as it does when the graphite is exposed. All the advantages of a clay crucible without danger of breakage are thus obtained. The life is also longer. Clay-lined crucibles are also equally advantageous in melting nickel for rolling.

The Use of the Liver of Sulphur Dip, and its Application in the Production of Various Finishes on Metals.

For the production of various finishes on metals, liver of sulphur is the most extensively used of any agent. It is one of the most common chemicals in a plating shop, and every plater is supposed to know how to use it. Simple thing that it is, it is abused and misused and even though many platers are very successful in producing certain finishes by it, they are not aware that others can be obtained with it. While it is possible to oxidize copper and silver by it, much care is needed to produce the good results now demanded in the trade. When well used, no agent is more satisfactory.

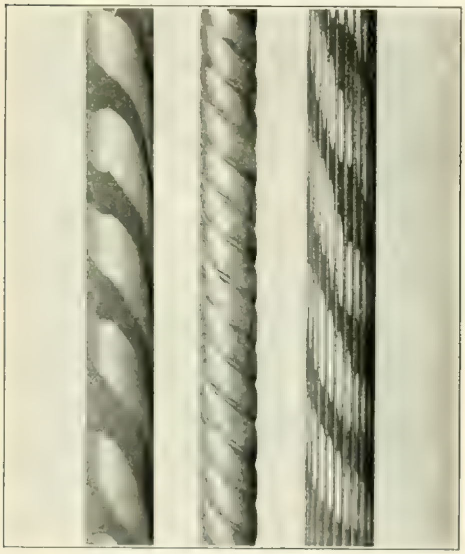


Fig. 1. **Striped Tubing, One of the Favorite Oxidized Finishes.**

What Liver of Sulphur Is

Strictly speaking liver of sulphur is supposed to be a compound of potassium and sulphur. Chemically it is potassium sulphide (the pentasulphide) but much of the liver of sulphur on the market is sodium sulphide. Both work equally well and the sodium sulphide is a trifle cheaper.

Liver of sulphur is made by melting potassium carbonate (pearlash) with sulphur in excess. The sulphur combines with the potassium, forming the potassium sulphide and liberating the carbonic acid. The melted mass is poured out and broken up when cold. As a mixture of equal parts of sodium and potassium carbonates melt at a lower temperature than either, it is sometimes used instead of the potassium carbonate. When well made, liver of sulphur has a dark "liver" color and dissolves readily in water, forming a yellow liquid.

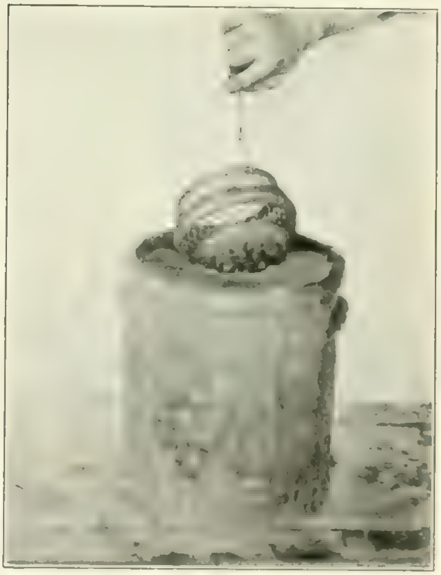


Fig. 2. **Method of Oxidizing with Liver of Sulphur.**

Liver of sulpher may also be made by boiling sulphur with strong caustic potash, and for some purposes this is the best kind for oxidizing as it contains an excess of potash.

Action of Liver of Sulphur on Metals

Some metals are not acted upon by liver of sulphur in solution while others are. It is those which are acted upon that interest us, and they are silver and copper. Some metals like lead or tin are acted upon slowly so that they are never colored in this manner.

When silver or copper is immersed in a liver of sulphur or any other sulphide solution, they become superficially colored black. This black color is caused by the formation of sulphide of silver or of copper on the surface. All other sulphides act in the same manner and form sulphides on the metals so that the ultimate effect is the same.

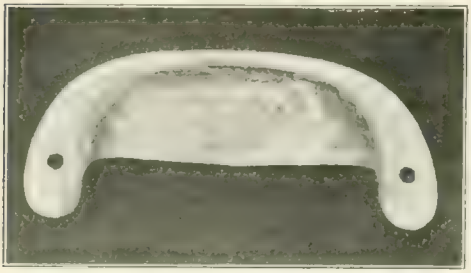


Fig. 3. Effect of Grease on Oxidizing. The Deposit Peels when Scratch-Brushed.

Oxidizing Copper

Both solid copper and copper plated articles are oxidized by liver of sulphur and a large number of articles are daily sold finished in this manner. A favorite finish on many classes of work using brass tubing is the so-called "striped finish." Tubing finished in this manner [illegible]. It is easily accomplished by copper plating the brass and then immersing it in the liver of sulphur solution. The stripped portions are then produced by cutting through the surface down to the copper by means of a buff wheel. The copper shows through forming a contrast to the black, oxidized surface.

Copper is readily oxidized by a liver of sulphur solution and it is customary to use it cold although it may be used hot if desired but the economy of liver of sulphur is that it may be rapidly lost as the action is rather rapid. There is no need, however, of using a hot solution when a cold one will do the work. The cold solution works well enough on copper for the majority of uses.

The manner of oxidizing solid copper or copper plated goods with liver of sulphur is as follows:

Dissolve from 1 to 2 ozs. of liver of sulphur in 1 gallon of *cold* water in a stone crock such as that shown in Fig. 2. When this has been done, the solution is ready for use. The object to be oxidized must be perfectly clean. In this respect *it is necessary that the article to be oxidized should be equally as clean as though it is to be plated.* Many platers overlook this fact and imperfect work follows. Even finger marks will show, and to be successful in oxidizing it is necessary to be as careful as though the best quality of electroplating is to be done. In Fig. 3 is shown an article that was oxidized without using care in cleaning the surface. When scratch brushed the black deposit was practically removed. Under such conditions it will flake off. Work that is fresh from the copper plating tank and has been rinsed will, of course, need no cleaning as it is in perfect condition; but other work that has been handled at all must be cleaned in the regular manner.

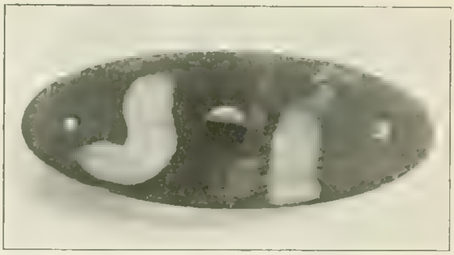


Fig. 4. The Deposit is "Sooty" and Rubs Off when the Solution is too Strong.

It is important, too, that the surface of the work to be oxidized shall be free from stain even though no grease may be present on the surface. If the stain is not removed, the liver of sulphur does not act evenly. To remove stains run the copper through a cyanide or muriatic acid dip and then rinse.

The Strength of the Solution

The strength of the liver of sulphur dip is a very important feature of a successful operation. If it is too strong, and particularly in hot weather, when the dip becomes warm, the black deposit formed will rub off. It then resembles soot and does not adhere. In Fig. 4 is shown an article oxidized in a strong, warm liver of sulphur solution and the black deposit on, which was rubbed off with the finger.

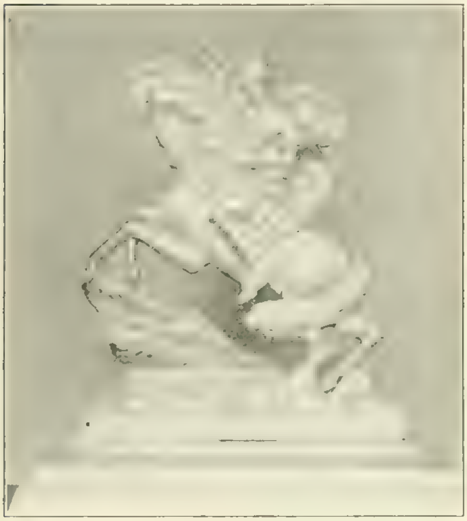


Fig. 5. Article before Oxidizing.

The best results in using a liver of sulphur dip are always obtained by using it somewhat weak and allowing the oxidizing to proceed gradually. If the black color forms immediately it is a sign that the solution is too strong. Good results may be obtained with a solution containing as little as [illegible] oz. of liver of sulphur to the gallon, but the color forms quite slowly under such conditions. Such a weak dip is used for obtaining the various shades of color that form on copper previous to the black. The red, mahogany and chocolate colors are all obtained by the use of a very weak dip.

For ordinary use, when the dip is cold, from [illegible] ozs. of liver of sulphur are dissolved per gallon of boiling water. As liver of sulphur varies in strength and the solution becomes old, the plater will have to judge about the right strength. Let it be noticed how the color forms. If it becomes black immediately, then it is too strong. If it passes through the red, mahogany and chocolate colors and finally arrives at the black stage, the best conditions are obtained.

If a liver of sulphur solution is to be used hot, then the quantity employed should not be over ¼ oz., or less per gallon. It is a mistaken idea that oxidizing copper cannot be done hot as it may be done equally as well in a hot as in a cold solution provided the hot solution is used of less strength. There is no advantage, however, in the hot dip and the cold one is almost exclusively employed.

Liver of sulphur solutions spoil rapidly during hot weather, and it is customary in many establishments to make them up fresh every day. As liver of sulphur is cheap, there is no good plan to use it after it becomes weak.

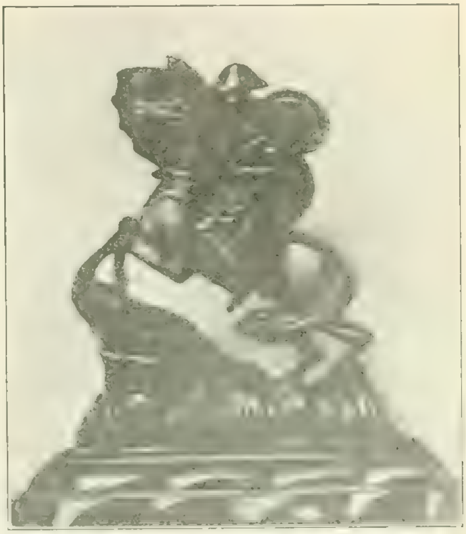


Fig. 6. Oxidized and Relieved by a Wheel.

Finish

When the color of the required shade has been produced on the copper, it frequently happens that it becomes more intense after drying. This is particularly true of the lighter of the colors other than black. [illegible] desired in the dip.

When the article has been removed from the solution, it is rinsed and [illegible] and then dried in the usual manner. Some platers use a weak pickle to "set" the color and this is a good plan for the best work. The pickle is made up of 1 gallon of water and 2 oz., of sulphuric acid. After coming from the liver of sulphur dip, the article is rinsed, then dipped into the pickle, and afterwards rinsed and dried. This pickle is not used by all platers, but many find it good particularly on the colors other than black as it enables the shade to be "set" and prevents it from changing.

Scratch-Brushing.

Scratch-brushing is necessary on oxidized articles as it removes the smut on the surface and brings out the lustre. It is usually performed dry and with a soft, brass-wire brush. If the job of oxidizing has been well done, the black will not come off; but if the metal was greasy or the dip too strong it will be removed. The scratch-brushing, therefore, is really a test. A soft buff wheel may also be used instead of the scratch-brush if desired.

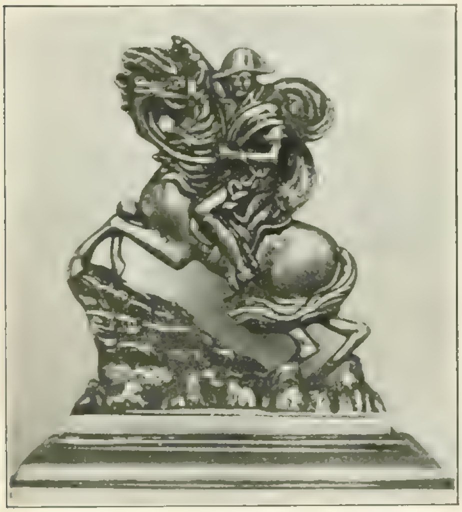


Fig. 7. Oxidized and Relieved by Hand.

Relieving

Much work is now turned out with the exposed portions or "high-lights" scoured down so as to expose the bare copper and then leave the oxidized surface in the background. The operation is an easy one when no particular artistic effect is desired, but when it is the person who does the relieving must have an artistic feeling in order to bring out the best effect.

The relieving may be done with a hard buff and rouge or any cutting compound such as tripoli or pumice. The operator will suit himself about this point as there are so many different effects desired that he will have to use the material for relieving that produces the desired result. The matter is easy, however, and should not cause any trouble. For ordinary work, such as striped tubing, a hard buff and rouge may be used.

In artistic work where the relieving is the life of the article, it is usually customary to use the fingers and pumice for relieving as it is then possible to relieve those portions which need it and cannot be reached by a wheel, and at the same time prevent others from being touched. Much work of this kind is spoilt by attempting to relieve with a wheel. In Figs. 5, 6 and 7 are shown the effect of relieving by a wheel and by the hand. In Fig. 5 is shown the article before oxidizing. In Fig. 6 the article has been oxidized and relieved by a wheel and an ordinary buffer. In Fig. 7 is the same article but relieved by the hand so as to bring out the best effect.

Red, Mahogany, Statuary-Brown and Chocolate Colors on Copper

By using a weak liver of sulphur solution, it is possible to produce various shades other than black on copper and copper plated goods. The solution should contain about 1/10 oz., of liver or sulphur to 1 gallon of water. The red color is produced first, then the mahogany, then the brown and finally the chocolate. By taking the article out at any of these stages, rinsing, drying and then scratch-brushing dry, it is possible to obtain some excellent effects and the process is extensively used for many classes of work.

If bronze, either solid or plated, is used, instead of copper, a beautiful brown is obtained and this remained more or less of a secret for some time. Platers were not aware that the oxidizing was done on bronze. The manner of producing it is the same as that of copper.

Yellow brass may be oxidized in a regular liver of sulphur solution, but the color is not uniform. If, however, some caustic potash is added to the liver of sulphur solution in the following proportions:

Water	1 gallon
Liver of Sulphur	2 oz.
Caustic Potash	8 oz.

and the solutions used hot, it is possible to obtain a good brown finish directly on yellow brass without any previous treatment.

Oxidizing Silver.

Silver is not evenly and uniformly oxidized by a cold liver of sulphur solution, so that it is customary to use it *hot*. The solution can be made stronger than 2 oz., to the gallon, although usually it is not needed. The color had better come up gradually as it then adheres better.

As much of the silver oxidized is relieved for producing French-gray work, it is desirable to have the oxidized surface as soft as possible to avoid taking off any more silver than possible. It is especially necessary on cheap, silver plated wares where as little silver as possible is put on.

The manner of doing this is to put some ammonia in the liver of sulphur dip. Two or three ounces to the gallon are used and the black deposit then formed is much softer than when the plain liver of sulphur is used. The relieving is easily accomplished. Some platers use ammonium sulphide for this purpose (hydrosulphuret of ammonia is the old name) but the effect seems to be identical with adding ammonia to the liver of sulphur solution. The ammonia seems to soften the deposit.

Zinc is the best coating for protecting iron and steel against atmospheric action as the zinc corrodes in preference to the iron on account of difference in electrical properties. Even a thin coating is sufficient and acts as well as a thick one while it lasts. A thick coating, like that produced in hot galvanizing, takes a long time to completely corrode so that the iron is protected during such a period.

The principal difficulty in depositing black nickel from its solution is in the use of too strong a current. The right amount is a current with a pressure of not over 1 volt. When this reaches 2 volts, the deposit is streaked, and a still greater amount causes the deposition of white nickel

Utilization of Wastes From White Metals, Reclaiming of Drosses and Recovering Tin and Zinc from Tinned and Galvanized Iron.*

(CONCLUDED.)

In the previous paper I treated of the subject of tin clippings and zinc wastes. I will now speak of other wastes from the white metals, such as zinky-lead, tin-lead, antimony and its alloys, babbitt, type-metal britannia and pewter. Also the oxides and skimmings that are taken from these metals, oxides and sulphate of lead, lead chamber wastes, "sweeps" from metallic paint works, skimmings from the pots in tin and terne plate industries, and any other residues containing sufficient metal to pay for their reducting or refining.

Zinky Lead.

One of the first things we found it necessary to treat was zinky-lead. As I previously stated, Western spelter carries about 1½ per cent of lead. In galvanizing, the spelter is added as often as necessary to keep up the supply in the bath. An ordinary pot will use 3 or 4 tons per week. A part of this lead sinks to the bottom of the bath, and when the bath is bailed out we obtain from 1 to 3 tons of impure lead. If this is melted in a large cast-iron pot, the molten zinc floats to the top and the lead settles to the bottom. The pot is heated just hot enough to melt the lead, and the particles of zinc, in a pasty state float on top. A large ring 2 feet in diameter and 6 inches deep is placed in the center of the pot. Then a ladle is taken, and by continual skimming the zinc is removed from the interior of the ring until we have a clean lead surface The lead is then bailed out and cast into molds or ingots

The heat of the pot is then raised and the zinc is melted. The product is still impure as zinc will carry about 2 per cent of lead and lead about 3 per cent of zinc that will not settle out by this process There is, however, considerable demand for lead for ballast, weights, counterbalances for wheels and other purposes, so that it is seldom necessary to refine the lead any closer. If we wish to do so, we have only to pass it through our refining furnace, in which the temperature may promptly be raised so high that all the zinc is volatilized and the lead becomes pure. The zinc is passed through our zinc furnace to refine in the same manner as the dross is treated.

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*This article is the conclusion of the one published in THE BRASS WORLD, March, 1909, page 85, and both of which are the complete paper originally read by the late Joseph Richards before the Franklin Institute. See the first paper (March issue) for full data.

Britannia and Pewter

The next to command my attention was old britannia and pewter. These metals are composed of tin, antimony and a little copper, varying in their composition from the English hall-marked pewter containing 92 per cent of tin, 6 per cent of antimony and 2 per cent of copper, to britannia which contains 30 per cent of tin, 6 to 10 per cent of antimony and 40 to 60 per cent of lead.*

Nearly all this metal is plated with silver, which it is first necessary to remove. We employed for this purpose, the method commonly called "stripping" by plunging the articles in nitric acid contained in a porcelain lined pot and permitting them to remain in the acid until all the silver was dissolved. The articles were well washed and dried, and then broken up and melted. The metal was used in making type, stereotype and babbitt metal. Its composition was changed, adding the desired quantity of tin, lead, antimony or copper, according to what mixture we desired to make.

The "stripping" pot was kept covered to keep the acid from evaporating, and from time to time we "loaded" the old plated ware until the acid was nearly neutralized. Then common salt was added, which precipitated all of the silver as chloride, which was fused with a flux in a plumbago crucible to reduce it to metallic silver.

I commenced about this time to make solder for the Standard Oil Company and had considerable quantities of skimmings from the solder pots. Failing to find a purchaser for these skimmings, I proceeded to utilize them in the following manner. I ground and then washed them in a very fine sieve, and by this means recovered directly 50 per cent of clean shot metal, and the oxide that was left was reduced in a crucible with carbon, yielding from 60 to 70 per cent of metal.

From that time forth I saved all my oxides for future treatment. For this purpose I built four air or pot furnaces like those used in brass melting. Their capacity was such that I soon used up all of the oxides in stock, and then I systematically visited all the metal works in this and neighboring cities and found nearly all of them sieving out their shot metal to melt in their pots. The dirt (as they called it), was thrown away. I persuaded them to save the dirt for me, and while the first lot came cheaply, it soon had a market value.

We reduced the oxides in crucibles and found that the resultant metal had a very complex composition. Although it was supposed to be tin and lead only, we found mixed with it all kinds of impurities, such as iron, zinc, copper, arsenic, antimony, nickel and other metals. This necessitated the refining of the crude reduced alloys so as to get them in marketable shape. If lead and tin predominated, 1 per cent of iron, zinc, copper or antimony rendered it unfit for solder, the natural product of tin and lead.

These crude metals were cleaned by using sulphate of zinc to remove arsenic, sulphur to remove antimony and superheated steam or chlorine gas to remove the iron. Salt, rosin, sal-ammoniac and other fluxes were used, leaving after treatment, a pure alloy of tin and lead for solder making. The crucible practice being found slow and unsatisfactory, I built one of the old fashioned furnaces such as the Chinese use in reducing tin ore, of which we soon had three in operation.

I found that they could be run continuously and that I could add to the charge the necessary flux to take the copper and iron down in the slag. The zinc and arsenic were partially volatilized, and, if desired, also a good part of the antimony. Business grew and this method was found too slow, so I built a water-jacketed furnace that worked much faster, the one furnace having a capacity ten times greater than that of the other three combined. Unfortunately, we did not do much work with this furnace, because of the ex-

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*It is apparent that the composition of pewter and britannia metal [illegible] Mr. R[illegible] pewter [illegible] We have, however, printed as given.—*Ed.*

orbitant charge of the city water bureau ($850 per year) to keep it cool.

I then built a furnace of peculiar design, perfectly adapted for this use, a furnace that gave me a perfect reducing flame, absolutely under control and saving 70 per cent in fuel.

In this furnace it was easy to treat 3,000 to 4,000 lbs., at a charge. I could slag out copper and iron, volatilize other impurities and obtain a much better product. The furnace was fitted with a large condenser to cool the vapors and recover any volatile matter that might escape and annoy the neigbors

In working this furnace the oxides are mixed according to their action in the furnace. The action of lead oxide (or litharge) on the fire brick destroys the lining of a furnace very quickly. I have known it to eat up to a thin wedge shape a 9 inch silica fire-brick in 48 hours. This action can be neutralized by using tin oxide and other oxides. No flux, or very little, is used and economic results are obtained.

The crude metal reduced from the oxides is liquated on an inclined hearth at a low heat, leaving copper, antimony and iron as a residue. After liquation, the metal is melted in a 10 ton pot furnace to produce a uniform mixture. When tested at this point, it usually runs 25 per cent tin, 70 per cent lead, 1 to 2 per cent of antimony, and a little iron and copper. This metal is treated in a manner similar to the zinc in the zinc furnace, using the desired reagents to remove the antimony, iron and copper. The treatment is continued until the metal is pure

Type metal oxides reduced in this manner make better solder than that made from metals found on the market The copper and antimony concentrates are used fór babbitt-metals. Alloys of copper in excess are used for brass. Alloys of tin, lead, and antimony can be used for, sterotype and electro type or linotype metals. Lead and tin alloys are used for solder

I will mention, in conclusion, the valuable aid that I have received in this work from the testing machine which I have devised.* It is a difficult and tedious task to determine the proportions of tin and lead in a tin and lead mixture, but with the help of this machine the result can be obtained in five minutes. These machines are now in use in all of the large smelting works in this country and Europe.

A New Tumbling Barrel For Use with Steel Balls.

A new tumbling barrel for use with steel balls in polishing small metal work has been placed on the market by Smith & Richardson of Attleboro, Mass. This barrel is also known in the manufacturing jewelry trade as a "Polishing-Tank" or "Tubbing-Machine." The machine is herewith shown It is used for polishing work by means of steel balls, a method of treating small metal goods that has become so popular and eficacious.

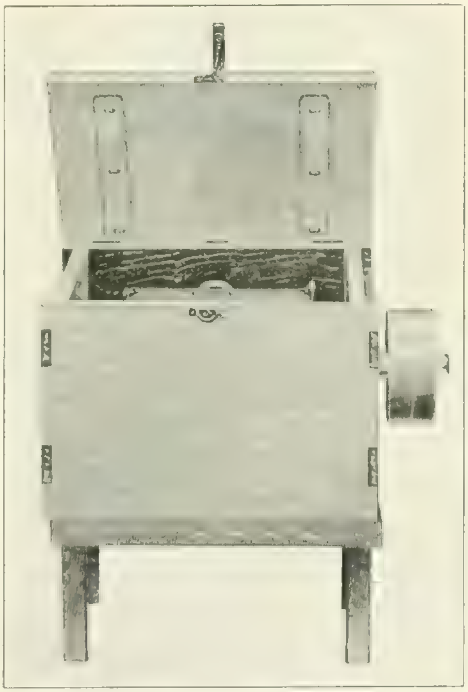

Fig. 1. Smith & Richardson Apparatus for Burnishing Small Metal Goods by Tumbling with Steel Balls.

The method of polishing by means of steel balls is to place the work to be polished in the barrel with a quantity of steel balls, and then add a soap solution. This soap solution is made of a special material for the purpose. A little ammonia is also frequently added to certain kinds of work. The whole is then revolved for some time, depending upon the character of the work, and the goods will then have a highly polished surface almost equal to a burnished one. This method of polishing is used to obviate hand buffing and forms a very cheap and efficacious substitute, as well as one that is capable of giving equal results. In the case of gold plated or rolled gold jewelry, the use of steel balls is the only pratical method for polishing, as burnishing is too expensive and any buffing operation would remove the gold.

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*Mr Richards was the inventor of the well known appliance called the "Solder Testing Balance by means of which a solder is cast in a mold and the casting then weighed on the balance. The percentage of tin and lead is then known by a simple reading of the scale The large difference in the specific gravity of tin and lead admits of good results.

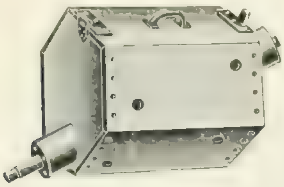


Fig. 2. View of Barrel. Shows Diagonal Shaft.

Ordinary tumbling barrels cannot be used successfully with steel balls, as one of special design is required. For this reason, Smith & Richardson have brought out the barrel herewith illustrated. It consists of a tank shown in Fig. 1, through which a shaft is run and to which are attached tight and loose pulleys. The whole device is furnished with a lid so that dirt will not enter and also to keep the solution from splashing out. In Fig. 2 is shown the barrel or "tub." This revolves inside of the box illustrated in Fig. 1.

A large variety of work may be polished with this barrel. Chains, collar buttons, buttons, pins. rings, charms, hat pins, buckles, clasps, and many other similar goods are daily treated in it. Not only can solid work be treated, but plated work as well. It makes no difference whether the goods are gold, silver, nickel, brass. bronze or copper plated, the results are the same. Not only are the articles turned out in a burnished condition, but the metal is actually hardened during the tumbling. The effect is the same as hand burnishing.

A New Solution for Electro-Tinning.

A new solution for tinning by electrodeposition has been patented by Henry L. Hollis of Chicago, Ill., and which is quite novel in its composition. The solution is applied, the inventor says, to the production of a uniform coating on sheet steel or iron to replace ordinary tin plate. Owing to the varying thickness of the sheet steel or iron used for producing tin plate in the ordinary manner (by dipping in melted tin) the tin coating varies greatly in thickness and on some portions does not come up to specifications, while on others it is much thicker than is needed. This obstacle, the inventor says, can be overcome by depositing the tin electrolytically with the following solution:

The plating solution used for depositing the tin is made up by taking 93 gallons of water and 7 gallons of hydrofluosilicic acid (this acid is made by dissolving in hydrofluoric acid all the white sand it will take up). To this soluton are added from 1 to 2 oz. of glue to every gallon. The object of the glue is to render the tin deposit dense and free from loose and non-adherent crystals.

The tin in the solution is not added directly, but is drawn from the anode. A cast or rolled tin anode is used (block tin) and a piece of sheet iron or steel is employed for the cathode. A current is allowed to pass for some time and until enough tin passes into the solution to give an amount sufficient for plating. The tin which deposits on the sheet iron may be saved. When enough tin has been drawn off from the anode, the solution is ready for use. The inventor says that zinc can be deposited in the same manner.

Tests on aluminum bronze wire made into Fourdrinier cloth and tested in paper mills, have shown that its life is much greater than the low brass wire commonly used for this purpose.

To obtain a heavy copper deposit the so-called "acid copper solution" must be used. When used, it is possible to deposit copper rapidly to any reasonable thickness. Cyanide copper solutions deposit copper so slowly that it is difficult to obtain a heavy coating

The Use of a Spray for Lacquering.

By W. A. Jones.

I have been called on so frequently for advice regarding the use of a spray for lacquering various kinds of metal work, that I have been impressed with certain advantages and limitations of this device. Many times I have not known what answer to give, and acting prudently, my answer has taken the form of a question. In this way I have had the advantage of getting the ideas of a number of capable men, working in widely different fields.

I have been impressed with the fact that when the use of a spray is discussed, the finisher is apt to be an ardent advocate or a determined opponent. However, that is the way all progress is brought about, and it takes both extremes to point the way. Quite a few are using the spray who have no real need for it on the present type of work and finish. It may lead the user to improve finishes Still more who ought to use a spray have never really considered it. There are a few truisms regarding sprays that may be helpful.

If you can really get satisfactory results by dipping your work, then stick to that method. It is economical in labor and material The result is quite uniform.

If you brush your work, what does the labor item amount to? If one or two girls can handle the work with a brush, you can save little on labor. If you have half a dozen or several dozen people applying lacquer with a brush, you can much more than cut your labor in half. The saving will depend on the work—on an average, I should say one spray will do the work of six people with the brush, and some times as much as ten or twelve

I think it is true that an experienced operator can lacquer anything with a spray as perfectly as it can be done with a brush Some work can be more perfectly finished by spraying. The spray certainly supercedes the brush when the labor item is to be considered, and on work that is tedious and difficult to brush, e g—a coating that it used for a gas stove top, elevator grill work, heavily embossed work and all relief work, and large flat surfaces where brush marks are apt to show. The list could be extended almost indefinitely.

There is a general idea that a spray uses an extravagant amount of lacquer. That is true if you throw a 12 in. spray to lacquer a 2 in., piece of work. If a small nozzle is used a spray will not use more lacquer than a brush. If anybody plays with the spray of course they will waste lacquer

So far we have considered the negative side of spray work. I would call special attention to the following advantages

In mixing lacquer for the spray, you measure out so much lacquer and thinner and this should be done accurately after determining the best proportions. This mixture then goes into the reservoir and is closed, and you always use a mixture of definite body. There is no evaporating, no thickening and heavy drip, no accidental thinning too much and work to be refinished on account of "rainbows."

There is a second *big* advantage.—There is no dirtying of the lacquer as from polishing material on the work or from bits of work falling into the lacquer dipping tank. From the first drop to the last the lacquer is clean as it goes on the work. There is no dirty lacquer to strain at night, nor water in the lacquer, nor old bottoms to work off.

It costs money to install a spray properly in case you have no air compressor.—Around $2000. is as cheap as you can expect to install the compressor, air reservoir and water draw off and on fine work a scrubber to remove oil from the compressor is desirable. In addition, you have the piping to fit it up and of course the spray itself, which is the least expensive part of the equipment

If you consider installing a spray don't do it unless you put it in right. Also be sure there is someone in the plant who will really study it and take an interest in the apparatus. The spray will not run itself and it is useless to put an ignorant man or woman to using it unless they are carefully instructed.

Regarding further uses of the spray, the finisher now has a new tool to work with,—another arm almost. It is not so new in Europe as it is here. A spray is [illegible] to do a lot of work and do it well. It seems to me to fit into the American order of things. We are learning to do plain work with it. Even on bedsteads it is being rapidly adopted.

When we are really familiar with it I am sure we will use the spray for developing old finishes and devising new ones. It offers great possibilities especially along the line of color work. We now do plain dipping and bronzing and some gold coloring and a little work in pigment coloring and that's about all. There is a big opportunity for the thinkers and workers and finishers.

Another possibility suggests itself. You can build up any thickness of finish with a spray, and that's a field to itself.

I have said nothing of how to operate a spray for the very good reason that I don't know from actual experience. I've heard a lot of the fellows tell how to do it and I've seen some of them demonstrate their ideas. They have different ideas, and there are good points to many different ideas. A discussion by those who are actually using sprays would be very helpful. Best pressure to use, how to draw off the condensed water, use of oil scrubbers, size of nozzle to use and other mechanical features. As regards the lacquer, whether it should be used heavy or thin, and whether it should be slow or quick drying.

Mechanical methods of automatically placing small work in position for spraying and carrying it into the dry room will undoubtedly be worked out.

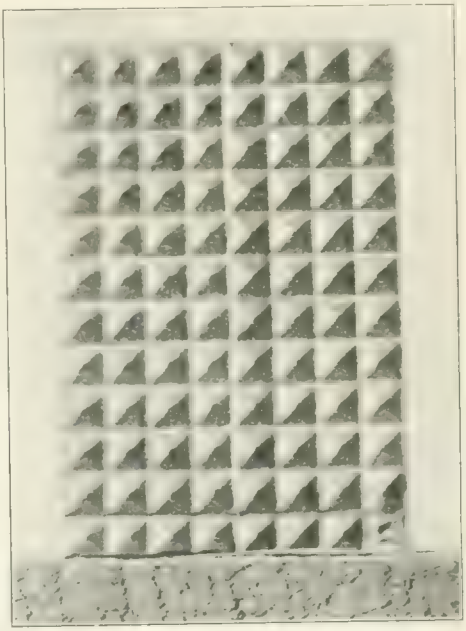
"Pyrametal" a New Stiffened Sheet Metal.

A new product called "Pyrametal" is shortly to make its appearance upon the market. It is made from sheet metal and rolled in the form herewith ilustrated. Small pyramids are raised on the surface (hence its name) which serve greatly to stiffen the metal.

To those unfamiliar with rolling, the making of such sheet metal would not seem a difficult task, but it cannot be made in the ordinary manner. Some Pittsburg inventors have constructed a rolling machine for producing the sheet metal in this form, but owing to the fact that nothing but a caveat has been taken out in the Patent Office, the details of construction have not yet been made public. The machine has not been placed on the market; but a model is now working in the shop of the A. Garrison Foundry Company of Pittsburg, Pa., the well known manufacturers of rolls and rolling mill machinery.

The advantages of sheet metal treated in this manner is the greatly increased stiffness and as many modern appliances, like automobiles or flying machines, demand the utmost stiffness together with as much lightness as possible, it would appear that the sheet will find a ready market.

The sheet herewith shown was rolled on the model machine previously mentioned. Two pieces of sheet aluminum, one rolled in this shape and the other not, were tested and the rolled sample showed less than half the deflection under the same load. Actual and accurate tests on various metals show that with a contraction of area of slightly less than 8 per cent, a transverse stiffness of over 100 per cent increase was found; and this in spite of the fact that in rolling the indented sheet is "nicked".



"Pyrametal": A New Stiffened Sheet Metal.

Another property of the sheet rolled in this manner is the dazzling appearance in the polished condition and which would seem to fit it for many ornamental and useful purposes. The inventors have experienced on aluminum, copper, brass, steel and tin-plate and in every instance have met with success.

Sheets of any length and reasonable width may be rolled on the machine, and in this connection it may be of interest to the trade to know that a machine is now being built for the Aluminum Company of America by the A. Garrison Foundry Company of Pittsburg. Pa., for rolling sheet "Pyrametal" 36 inches wide and 84 inches long. The rolling of the metal is done cold.

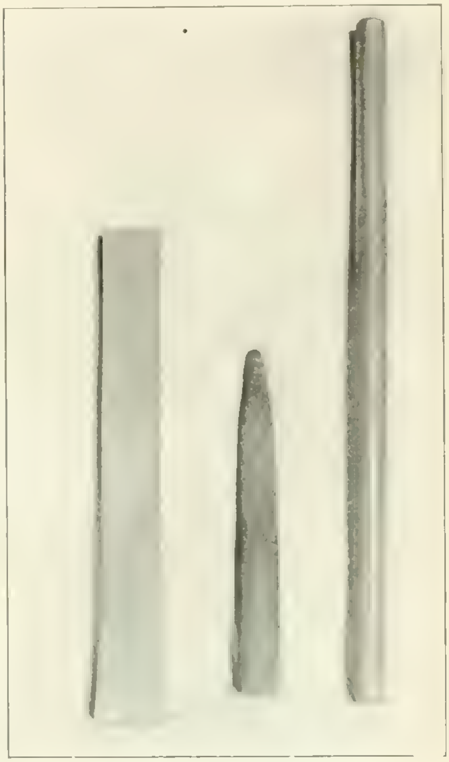
Artificial Graphite Stirrers.

In making mixed metals it is necessary, after the constituent metals have been melted, to stir them in order to produce an intimate mixture. For common metals iron is used, but it always introduces more or less iron into the metal. While not of much account in many classes of work, in others a sufficient quantity is taken up from an iron stirrer to injure the metal. In cartridge metals, German-silver and similar high grade alloys, iron stirrers cannot be used without danger. In the phosphor-bronzes iron cannot be used at all as phosphorous and iron combine so readily that an iron rod may be completely dissolved in a short time.

Graphite stirrers have long been used and give excellent satisfaction as nothing is introduced into the metal from them. Those made of artificial graphite seem to give excellent results as it is possible, on account of the manner in which they are made, to produce a very strong and homogeneous material. The International Acheson Graphite Company of Niagara Falls, N. Y., the well known makers of artificial graphite are now making stirrers from artificial graphite, some of which are herewith illustrated. They contain nothing but graphite so that no metal can be contaminated.

The middle stirrer was one used at the works of Wm. Cramp & Sons, Ship and Engine Building Co., at Philadelphia, Pa., for two and a half years. Benj. H. Cramp of this concern has made the following comment upon it: "It has remained in constant use; we have used it entirely with babbitt and white metals not requiring high degrees of heat. The ordinary graphite rods we have used under the same conditions are worn out and useless in about one month's time."

The graphite may be machined to any desired shape or size and in the illustration the stirrer at the left was machined from regular stock for special use. The round stirrer at the right was the original size of the stirrer furnished Wm. Cramp & Sons, S. & E. B. Co.



Artificial Graphite Stirrers.

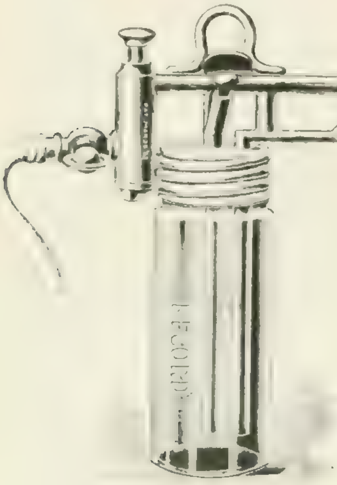
It was originally 1 in. in diameter and 2 feet long. The even wear may be appreciated by referring to the middle photograph showing it after 2½ years use.

All articles to be silver plated should first be given a light preliminary coating of silver in a striking solution or the deposit of silver is apt to strip.

Although clay crucibles are used in England and in other European countries in melting metals, they are not used at all in the United States for such work, either for the melting of steel or brass. It is many years since the last crucible steel manufacturer abandoned the use of clay crucibles for those of graphite.

The "Record" Air Brush.

The interest that is now being displayed in lacquering by the "spray" method is evidenced by the new apparatus for spraying the lacquer that is now being placed on the market by the Eureka Pneumatic Spray Company of 400 Canal St., New York City. This new apparatus is called the "Record Air-Brush" and is herewith illustrated.



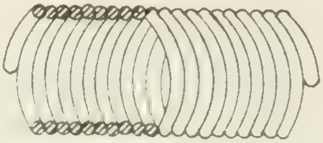
The "Record" Air Brush.

The reservoir consists of a glass jar so that the lacquer may easily be seen in it, and at the same time prevents any contamination. Six glass jars are furnished with the apparatus. An agitator tube penetrates the liquid in the reservoir so that it may constantly be stirred up if desired. This is an important feature when using bronzes or liquids containing pigments which settle down to the bottom. Before using, the agitator valve may be opened so that there is a slight bubbling, or it may be closed when not needed. With lacquers it is unnecessary.

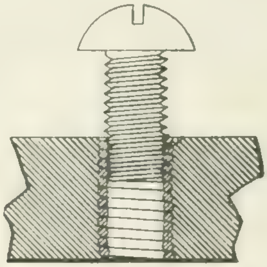
This air-brush has been brought out by the company to meet the demand for an inexpensive sprayer and the price at which it sells will certainly admit of even the smallest establishment using it. In addition to its use for lacquering, this apparatus is employed for bronzing, painting and spraying cores and molds. There are undoubtedly many other uses for air-brushes yet undiscovered, but which time will disclose.

A Unique Method of Molding Threads in Castings.

A novel method of making threads in castings while in the mold has been brought out by Joseph Bedell of Rensselaer, N. Y., and which is intended to obviate the need, on certain kinds of work, of tapping out a hole in the usual manner for the purpose of cutting a thread. For many kinds of work or in castings that are too hard to drill the method would seem quite feasible.



Wire of any desired section is wound in the form of a spiral as herewith shown, and inserted in the mold. Various means are necessary for holding it, depending upon the character of the casting. It is usually inserted like a chaplet. The metal is cast around it and holds it firmly in place. The screw is then inserted in the usual manner. While not a fine machine job, it is said that the screw holds for many purposes.



* * *

When a bearing runs hot it is dangerous to allow the shaft or axle to continue to revolve. After a while either the bearing becomes hot enough to break, or if it is made of a tough metal, the steel shaft siezes the bearing surface and finally becomes twisted off. This is undoubtedly the reason for many breakages in railway car axles.

The "Schaap" Flame for Fusing and Welding by Gas and Air.

One of the remarkable agents of the present time is the blowpipe flame by means of which metals can be rapidly melted, no matter what size or shape they are in. It has opened up an entirely new field and the manufacturer is always finding new uses for it.

Along this line and equally as remarkable is the invention of Alexander K. Schaap of the Schaap Flame Utilities Corp., 344 Cumberland St., Brooklyn, N. Y. He is the inventor of the "Schaap" flame that is now creating so much interest and by means of which, by the simple use of illuminating gas and air, it is possible, practically to duplicate the results of the oxy-hydrogen or oxy-acetylene flame. The expense and cost of installation, however are much less. It is probable that were the invention of Mr. Schaap known before the appearance of the other methods of welding, that his, and not those, would have made the history of welding as it now stands.

The invention of Mr. Schaap is a blowpipe in which air and ordinary illuminating gas are used and by means of which very high temperatures can be obtained. In Fig. 1 the blowpipe is shown and the operation of welding an engine cylinder illustrated. In Fig. 2 another view is shown. In Fig. 3 the operation of welding another casting is shown.

One of the remarkable features of the blowpipe is the fact that metals can be melted under the water as shown in Fig. 4. The flame parts the water.

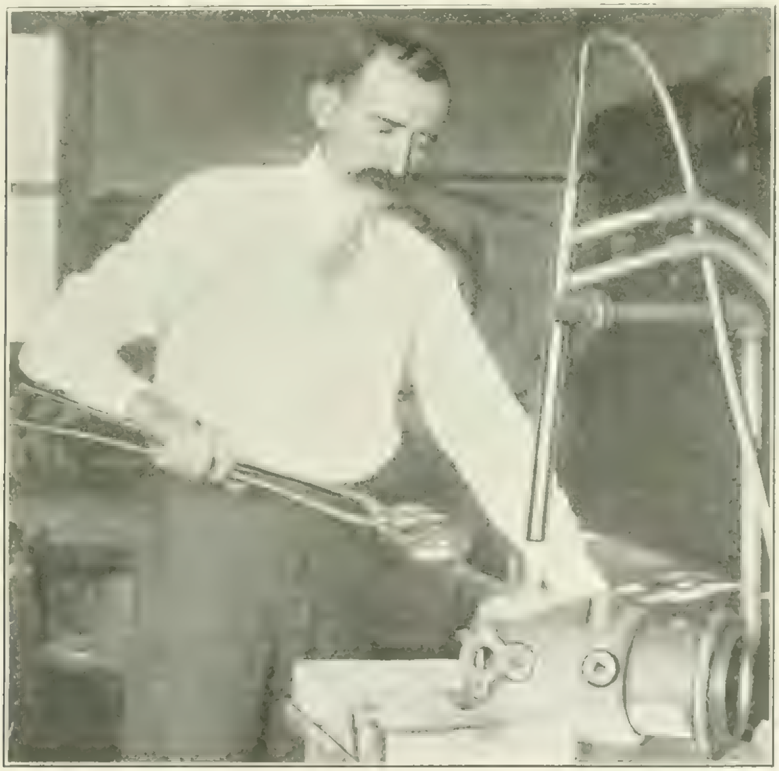


Fig. 1. The Inventor, Alexander K. Schaap, Repairing a Broken Casting with the Blowpipe.

Some of the tests that can be done by the blowpipe are as follows:

Welding cast iron.

Repairing aluminum castings, brazing joints, etc.

Welding brass or bronze or aluminum.

Building up castings by melting on metal.

Welding copper.

Spinning metals red hot in a lathe.

Filling up blowholes in any kind of casting.

Taking short heats while metals are in a lathe.

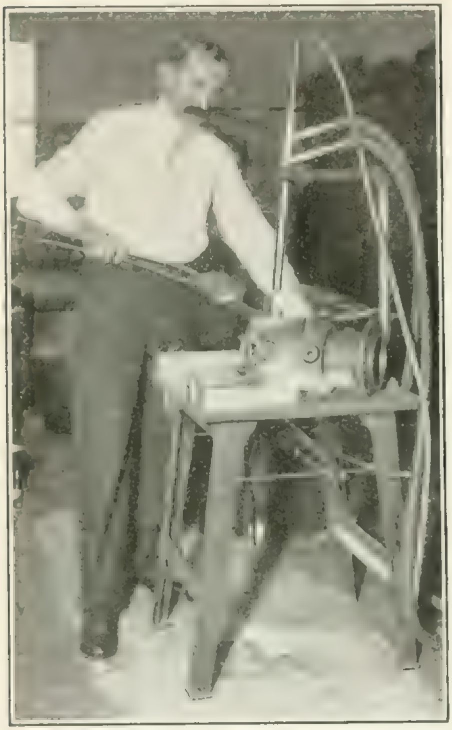


Fig. 2. Another View of Fig. 1, Showing Air and Gas Pipes.

Many other feats too numerous to mention may be performed. Some of the finest aluminum repair work has been done by means of the blowpipe flame.

The blowpipe is made in a large number of sizes for large and small work. For silversmithing and jewelers' use, the flame is made as small as the size of a match, while any size may be used for large work. The inventor at his works is constantly giving demonstrations of the flame showing what it will accomplish and the manner of using it. The ease with which it may be used and the fact that nothing but illuminating gas and air are used, renders it particularly attractive for many uses and manufacturers should investigate its merits. It may readily be called a remarkable achievement in the line of blowpipe flames.

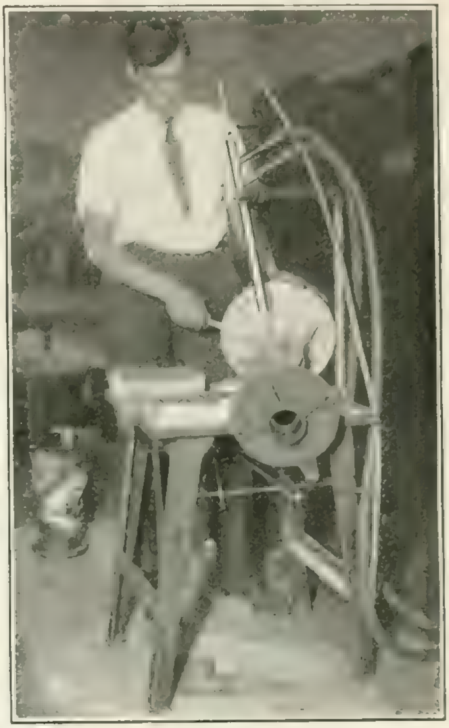


Fig. 3. Repairing a Flaw in an Aluminum Casting with the Blowpipe.

An Improvement in Making Molds for Casting Aluminum.

Aluminum is usually cast in green sand like other metals for the reason that its shrinkage is too great to allow anything but simple shapes to be made in metal molds like the lead or tin alloys. It is well known, however, that when aluminum is cast in metal molds, it becomes much stronger and harder than when cast in green sand. The sudden chilling which the metal receives is responsible for the change. Various attempts have been made to cast aluminum in metal molds, and in some shapes, where the casting is free to shrink, it has been attended with success; but when the shape is complicated, the castings are usually ruptured in shrinking.

A new form of molding sand for use in casting aluminum has been invented and patented by Earl Blough of the Aluminum

Company of America of Pittsburg, Pa. (U. S. Patent 915,728, Mar. 23, 1909.) The sand is used in exactly the same manner as ordinary molding sand and, therefore, no change in molding methods are necessary.

The material used is a sort of ground carbon mixed with the usual molding sand. This carbonaceous material may be of various kinds, but the following composition is given by the patentee as very good: Petroleum coke 50 parts, electric light carbon 25 parts and coaltar pitch 25 parts. The whole is mixed and then baked at a high temperature after which it is finely ground. This finely ground carbon is then mixed with the molding sand in the following proportions:

Molding Sand	85 lbs.
Ground Carbon	15 lbs.

The carbon is ground as fine as necessary for any particular purpose, but for ordinary use a 200 mesh sieve is recommended.

The advantage of the carbon in the molding sand is that it is a good conductor of heat and thus serves to chill the aluminum. In this manner it acts similar to a chill mold, but at the same time does not produce a rigid mold as the sand is molded in the usual manner. The patentee states that the grain of the aluminum cast in the mold is finer and the metal sounder and stronger. With an alloy containing 92 per cent of aluminum and 8 per cent of copper, it is stated that the tensile strength is increased from 15 to 25 per cent when cast in a mold made in this manner.

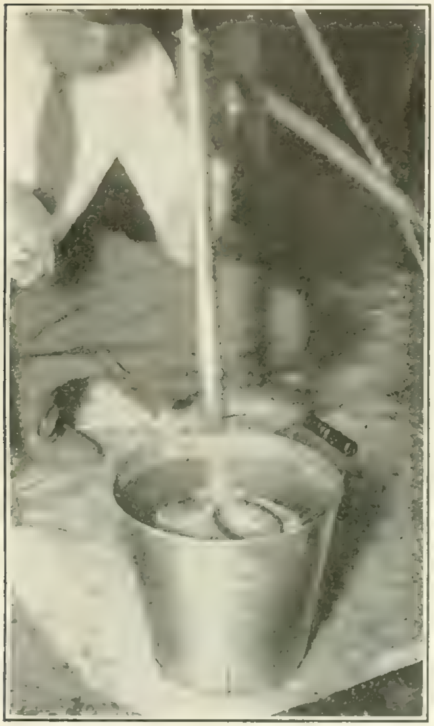


Fig. 4. The Remarkable Feat of Melting Metal Under Water with the Blowpipe.

How to Use Burnishing Compounds in Tumbling with Steel Balls.

Many concerns which have attempted to use steel balls for burnishing small metal goods have met with little success, on account of the difficulty encountered in knowing how to do the work. To obtain the steel balls is one thing and to be able to use them is another. When properly used they are an excellent and rapid method of polishing small work, and the cost in doing the work is very low. If they are not employed as they should be, the results are quite unsatisfactory and frequently the work is spoiled.

The first requirement in tumbling with steel balls, other than the steel balls themselves, is a good compound for use with them. If one has ever watched a burnisher at work, it will be noticed that he uses a soap for burnishing. Many have secret compounds for this work which give good results. In tumbling with steel balls, it is necessary to use some material which will lubricate the balls and cause them to slip over the work instead of abrading it. To be of value such a compound must neither attack the work nor the balls. Ordinary soap is valueless for the purpose, as it both tarnishes the work and corrodes the balls. As a result of experimenting, special compounds are now made which are particularly adapted for use in steel ball tumbling and doing this class of work. *In tumbling with steel balls under* [illegible] *must be used.*

There are many classes of work that can advantageously be treated before tumbling by a suitable abrasive compound made for the purpose. Steel work usually requires a preliminary treatment of this kind in order to prepare the surface for steel ball treatment. Just as one would hardly expect to burnish silverware without preliminary scratch-brushing, so the preliminary treatment of work for steel ball polishing is necessary. In the preliminary treatment, the articles are tumbled for about thirty hours in a mixture of a special polishing compound, sawdust and water and the surface is then in good shape for tumbling with the steel balls. After rinsing, the work is ready.

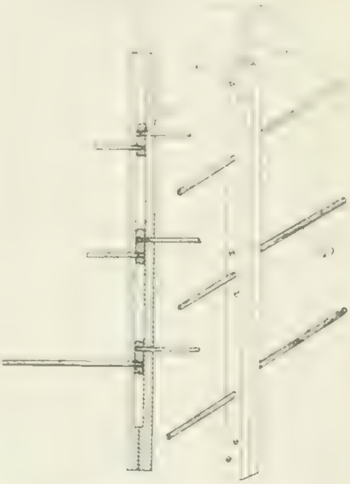
In tumbling with steel balls and the burnishing compound used with it, it is necessary to use much judgment in carrying out the process. It will not suffice simply to place the articles, steel balls, and burnishing compound in the barrel and tumble them. They must be tumbled until actually burnished, whether one or ten hours is consumed. This is where the ordinary establishment fails and steel ball tumbling is compound. When intelligence and judgment are used, however, it is possible to produce, with a suitable burnishing compound, results in steel ball polishing that will compare very favorably with buffed work; but it should be noted that the compound used for tumbling is equally as important as the steel balls themselves, and unless it *is* suited for the purpose, there is nothing gained.

An Improved Rack for Electroplating.

The regular form of plating rack is open to some objections as it exposes a large surface to the action of the current and thus becomes coated with metal. This not only wastes the metal, but consumes electrical energy as well. As the rack becomes heavily coated, the current consumption also increases.

A new form of electroplating rack has recently been patented by Douglas B. Moyer of Detroit, Mich. (U. S. Patent, 915,786, Mar. 23, 1909), which is herewith illustrated. The object of the rack is to protect the main rod and also to be able to easily and quickly replace the side conducting rods.

A main rod A is bent at B so as to form the hook for hanging on the tank rod when immersed in the plating solution. This rod A is left on the upper bent portion and then two pieces of wood, C, are fastened to it so that it is entirely covered. These pieces of wood are screwed together with ordinary wood screws. Passing through the wood are the arms D upon which the work to be plated is hung. These arms are furnished with a threaded end E which screws into the rod A and thus makes a connection. When the arms D upon which the work is hung, become coated with metal so as to become useless, they are easily removed and new ones screwed in their place. The pieces of wood prevent any metal from depositing upon the large rod A so that in reality the arms are all that need to be replaced and this may be done at a small expense and with little labor.



Moyer's New Plating Rack.

Stained nickel work is frequently caused by the use of hot water that has become contaminated with the plating solution.

The steel cutlery grinders of Sheffield, England, it is said, remove dust from the eye by blowing a little powdered sugar into it. The pain is lessened and the dust is removed.

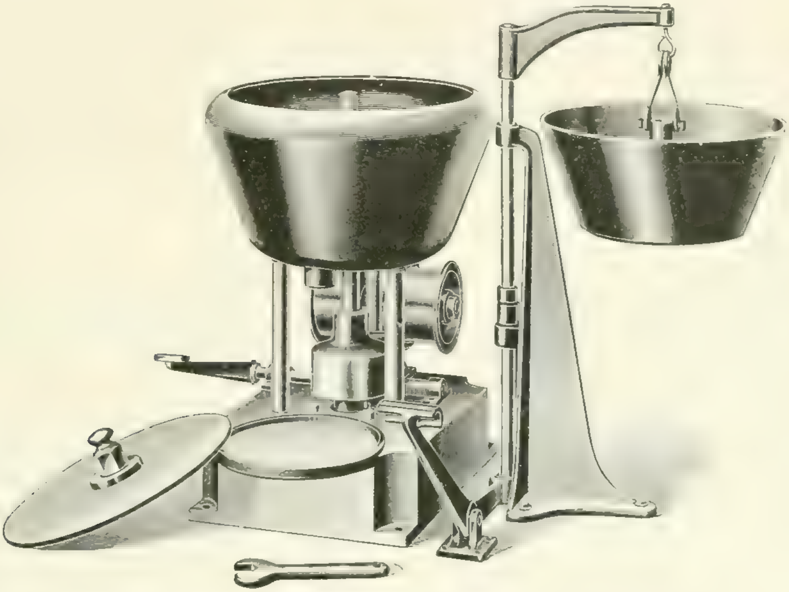
A hot cyanide zinc strike is frequently efficacious in electrogalvanizing steel as it removes the film of grease and leaves a good surface for the regular zinc deposit. It is used in electrogalvanizing steel carpenters'-squares and gives good results.

The "Curtis" Centrifugal Dryer.

Modern electroplating demands that small work shall be handled rapidly without increasing the cost, and at the same time produce equally as good a product. The matter of drying out small work has always been a problem of manufacturers, as sawdust is difficult to remove from many classes of work. For this reason the centrifugal dryer is becoming more extensively used.

In drying out nickel plated or other kinds of work it is unnecessary to use any hot water as it dries out perfectly from the cold water rinse. This feature saves time and money.

The dryer herewith shown is made to take a large amount of work, but a smaller size is also made for use in establishments, such as those manufacturing jewelry, jobbing platers or ones in which the quantities are small. The pan in this machine holds 11 quarts, and the price of the machine is such that it is within the reach of all who may desire to install a centrifugal dryer, but do not desire or need a large one.



The "Curtis" Dryer for Drying Out Small Metal Goods, such as Screws, Pins, Eyelets, Studs, Hooks, Jewelry, etc., etc., without the Use of Saw Dust. The Goods are Dried by Centrifugal Action.

The "Curtis" centrifugal dryer made by the Centrifugal Dryer Co., 25 Union St. Worcester Mass., is now in use in many establishments for drying-out plated work of other kinds that are wet. This dryer is herewith illustrated. It consists of a sheet steel pan one-eighth of an inch in thickness and which will not break under any condition. The articles to be treated are placed in it and revolved for a few minutes when they become completely dried. A small arm operated by a foot lever allows the pan to be raised and lowered. This hoist is a very convenient accessory as it obviates the need for hand lifting

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Sterling-silver flat-ware and hollow-ware is frequently silver plated after it has been completed in order to remove the "fire" surface which has an unsatisfactory lustre, or to increase the weight lost in the "firing" dip, or to cover up the color of silver solder used in the manufacture. Pure silver is whiter than sterling silver and plating improves the appearance of the article.

Questions and Answers.

QUESTION No. 617. What can be used to give ingot metals a smooth surface on the top. When they are cast and left to cool in the ingot mold, the top beomes rough. They cannot be removed before they have set, otherwise dumping into water might be efficacious. We refer more particularly to casting yellow brass and composition ingots.

Answer. A smooth surface may be obtained on the top of ingot metal by pushing a thick cast-iron plate over the top of the ingot mold after the metal has been poured and before it has set. This at once chills the surface and prevents the oxidation. It also prevents shrinkage and ingots without the usual depression in the middle may be produced.

QUESTION No. 618. In brass melting is there any advantage of gas over oil?

Answer. Gas is preferable on account of the ease and cleanliness in its use, but it is quite expensive compared with oil if a good quality of gas is taken into consideration. Oil has proved to be the cheapest and most concentrated fuel for melting.

QUESTION No. 619. Is it possible to use the corrosion process for the production of cheap verde antique work?

Answer. As far as known there is no process for producing the verde-antique by the corrosion process that will admit of use on cheap work. It is too time consuming. The pigment process will have to be employed for such goods, and when well done it very closely resembles the corrosion results.

QUESTION No. 620. We would like your opinion as to the feasibility of using manganese-bronze for bearings. The bearing is to be used on a 10 or 12 inch shaft making 120 revolutions per minute. I am using a mixture containing 80% copper, 10% tin, 10% lead and 0.20% phosphorus which gives good satisfaction, but a competitor maintains that manganese-bronze is superior.

Answer. Experience has taught that the best bearing bronzes are those which contain lead and the leading manufacturers of railroad journal bearings use bronzes containing a very large quantity of lead (the well known "Plastic Bronze" contains 30% of lead) as this metal gives a lubricating quality to the surface of the metal while in use and thus prevents heating and wear. While bearings of manganese-bronze might answer in your case, it is usually assumed that this alloy is inferior as a bearing metal. Cast iron, of course, is used for many kinds of bearings, but at the same time it is not considered a good one.

QUESTION No. 621. What is the formula of the solder that is used for soldering platinum to 18 karat gold?

Answer. A gold of a lower karat is generally used for soldering and the following (which is 15 karat) will answer:

Fine Gold	18 dwt.
Fine Silver	4 dwt.
Pure Copper	5 dwt.
Zinc	2 dwt.

The solder may also be made by taking 1 dwt of 18 karat gold and adding to it 5 grains of sheet brass (yellow) while melted. This formula is a general one for ordinary use and may be employed for many purposes.

QUESTION No. 622. How can a nice, dead white silver be obtained on brass clock dials without getting the black wax out of the figures?

Answer. The usual method of silvering clock dials is by means of a paste rubbed on with a soft, clean cloth. This paste is composed of the following:

Chloride of Silver	1 oz.
Cream of Tartar	2 oz.
Common Salt	2 oz.

These ingredients are ground in a porcelain, glass or stoneware mortar to mix well and then a little water is added to make a stiff paste. This paste is rubbed on the dial with a soft rag. The paste thus made should be kept in the dark or in a black bottle, as light decomposes it. Whiting is often used with the paste (it is ground with it when the ingredients are mixed) and serves to scour the surface while the paste is applied. About 2 oz. are added to the preceding mixture when it is desired to use it. Some workers prefer it while others do not use it. The silvering may be done with or without it.

QUESTION No. 623. I am sending you a piece of copper casting. The casting has a bad spot on the top side near the gated end. The rest of the casting is better, but I frequently find the same spots elsewhere. I am not troubled by blowholes and these spots are the difficulty. I use 95 lbs. of copper and 5 lbs. of zinc. Is there a better mixture?

Answer. An examination of your casting shows that the spots are caused by dross. In casting copper with the small quantity of zinc that you have used, it is difficult to avoid them. The metal does not run clean and we fear that you will find blowholes in your copper if you inspect them. They are best seen in a fracture as the gate end is battered down by cutting off the gate so that it does not show them. We do not advocate the use of zinc for making copper castings as it produces the difficulty you have encountered. We prefer either silicon or magnesium. The silicon is added in the form of silicon copper containing about 10% of silicon. Take 99 lbs. of copper and 1 lb. of the silicon copper and you will find good results and clean castings. When magnesium is used about 2 oz. of it are added to every 100 lbs. of copper. It is pushed down under the surface with tongs and the metal at once stirred. The castings also come clean and sound with it.

QUESTION No. 624. Can a lacquer be obtained that will protect tinned work from corrosion when exposed to the weather?

Answer. Yes. Any of the lacquer manufacturers who advertise in our columns will be able to supply you, but you should let them know what you are to do with it so that the right grade may be sent you.

QUESTION No. 625. How can I produce a green color on brass or copper, that will not rub off?

Answer. We presume you refer to the verde-antique and this is done by sand blasting the article if of solid bronze or copper, and if brass, it must be first heavily copper plated. The surface is then strongly oxidized in a liver of sulphur solution and then is immersed in the following solution or it is brushed on the surface.

Water	1 gal.
Sulphate of Copper	8 ozs.
Sal-Ammoniac	8 ozs.
Common Salt	4 ozs.
28° Acetic Acid	2 ozs.
Chloride of Zinc	1 oz.
Glycerine	1 oz.

The article to which the solution is applied is allowed to remain in a damp place, slightly warm. A closed box is best, but the heat should not be sufficient to dry the surface. The object is to allow the corrosion to take place while damp. When this is done, the verde can frequently be obtained in a few hours. Several coats may be necessary. When the desired color has been obtained, the article is well dried and then given a coat of flat lacquer.

QUESTION No. 627. We have tried to metallize some rose buds after the method described in THE BRASS WORLD as "Warner's Method." We coated the buds over with varnish and then with copper powder, but when we place them in the acid copper solution, the powder seems to wash off. The deposit will only "take" in spots. I send you one of the attempts as well as some of the copper powder. Where is our trouble?

Answer. Your trouble lies in the copper powder that you have used. It is altogether too coarse and will not adhere. The powder will have to be without grain or as fine as it is possible to make it. You may have difficulty in obtaining it in your section, and if so use electrotypers' graphite as it will take the copper deposit well. It takes longer to deposit, but the final results are good. Use ordinary varnish (turpentine varnish) and when nearly dry or "tacky" apply the copper powder or graphite. It will then adhere.

QUESTION No. 628. What mixture can be used for rolling mill brasses that are used on a tin-plate mill? We should think that a leaded bronze would hardly be suitable for this purpose.

Answer. Bronze mixtures high in lead are apt to break under such conditions, or the lead sweat out from them. A straight copper and tin mixture containing 9 lbs., of copper and 1 lb., of tin is often used on tin-plate mills. The addition of a little phosophor-tin may be necessary in casting to prevent blow-holes and "tin-spots."

QUESTION No. 631. We are making some castings in the form of a short, round piece about 2 in. long and 1 in., in diameter. There is a core in it which enters from one end but does not come clear through. In other words, the casting is open at one end but not the other. They are made of brass and we obtain 82 per cent., good ones and the rest blow. The blow is at the extreme end of the solid portion, at the end of the core. They are frequently not discoverd to be bad until some machine work has been done upon them. We use a linseed oil core and would like to know how to prevent the blow and the production of the imperfect castings.

Answer. Your trouble is in the core. Either it is not well vented or it is made of too fine sand. Possibly the blacking on the surface, if you have used any, is also one of the causes, as this material, if not of the right kind, will frequently cause such trouble. It is especially true when cores are blackened by dipping into the blacking. You will have to ascertain yourself where the difficulty lies then; and if, after investigation, you find that the cores still blow, then we advise trying something besides linseed oil for making up the core.

QUESTION No. 632. We have tried Loeb's method for copper plating aluminum and find that it blisters and peels after a time. Can you suggest any other method which will not do this?

Answer. Copper plating by Loeb's method requires much care in the preparation, but when it has been done, you can obtain a deposit that will stand. Another method is to first copper it in an acid copper solution, after careful cleaning. This also gives good results and has been successfully used.

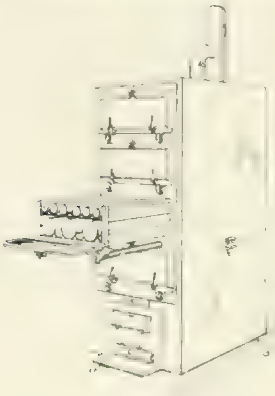
QUESTION No. 636. Can manganese-bronze be made without the use of tin in the mixture? We have tried to make it and believe we have the right formula, but when we add the tin the metal has a coarse, crystalline fracture and when the tin is omitted the fracture is fine grained and [illegible] the strength is good.

Answer. The object of tin in manganese-bronze is to raise the elastic limit, and it was originally introduced for this purpose. It is, however, a troublesome ingredient and produces the difficulty you mention. It is now generally considered, however, that it is possible to make a manganese-bronze conforming to specifications without it.

Patent Abstracts.

914,837, Mar. 2, 1909. APPARATUS FOR USE IN SMELTING ZINC ORE, GALVANIZERS' DROSS AND THE LIKE. Evan Henry Hopkins of Addlestone, England. A method of smelting zinc bearing materials. The zinc is distilled in the usual manner in a clay retort but the vapors are passed through incandescent carbon contained in a separate condenser. In this manner the lead is held back in the separate condenser and purified zinc obtained.

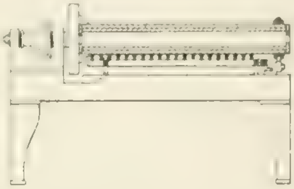
916,069, Mar. 23, 1909. CORE-OVEN. George H. Wadsworth of Cuyahoga Falls, Ohio. A core oven designed as in the illustration. The shelves holding the cores rest on rollers so that they are easily removed for the removal of a core. When a shelf is removed, the door is closed by a plate on the end of the shelf which effectually closes it.



915,158, Mar. 16, 1909. MOLDING MACHINE. Albert O. Backius Jr., of Chicago, Ill. Assignor to the National Malleable Castings of the same city. A machine for making sand cores, but which dispenses with the hand manipulation of the core box. With suitable modifications the machine can be employed for making molds.

914,354, Mar. 2, 1909. FILAMENT FOR ELECTRIC GLOW LAMPS. Hans Kuzel of Baden, Austria. A filament for use in incandescent lamps and consisting of tungsten and antimony. It is claimed that the antimony increases the resistance of the filament and a better light is obtained. From 5 to 10 per cent antimony are used.

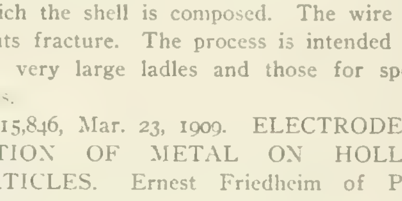
914,459, Mar. 9, 1909. PROCESS FOR UNIFORMLY COVERING HOLLOW BODIES WITH LEAD. Vitus Schwaninger of Oggersheim, near Mannheim, Germany. A method of coating iron pipe with lead. The pipe is tinned and then filled with lead. The pipe is heated underneath by gas burners, and then rotated by power. The lead, by centrifugal action, uniformly coats the interior.



915,250, Mar. 16, 1909. LADLE. Munson H. Treadwell of New York City. A ladle with wire cast in the cast-iron or steel of which the shell is composed. The wire prevents fracture. The process is intended only for very large ladles and those for special uses.

915,846, Mar. 23, 1909. ELECTRODEPOSITION OF METAL ON HOLLOW ARTICLES. Ernest Friedheim of Paris, France. A method of electroplating the inside of tubing. An anode is placed inside of the tube and prevented from short circuiting by contact by the use of a perforated insulating layer which surrounds the anode, but allows the current to pass through and the free circulation of the plating solution.

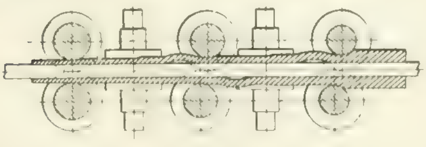
914,584 and 914,585, Mar. 9, 1909. MOLDERS' FLASK and EXTENSIBLE FRAME FOR MOLDERS' USE. Joseph M. Lamb of New Britain, Conn. A molders' flask and the so-called upset for use with it. The flask is made of sheet steel stiffened by a beaded edge and corrugations. It is also made so that it may be adjusted for different size molds.



913,874, Mar. 2, 1909. PROCESS OF TREATING AND UTILIZING SULLAGE FROM MOLTEN METALS. Wm. H. Carpenter of Bristol, Conn. Assignor of one-half to A. L. Haasis of Brooklyn, N. Y. The claim in the patent is for skimming from a crucible into water so that the charcoal and metal separate from the oxides. In this manner it is possible to reclaim practically all of the metal in the skimmings. This is the patent on the apparatus of the Metal Dross Economy Company of Bristol, Conn.

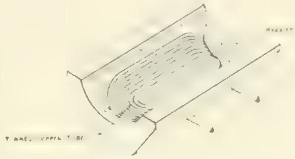
915,249, Mar. 16, 1909. APPARATUS FOR WELDING BY ELECTRICITY. Chas. E. Thompson of Cleveland, Ohio. Assignor to the Electric Welding Products Co. An apparatus for welding various forms of metal and the novelty lies in the construction of it. It is made so that the metal is more uniformly heated than in those previously in use and a better weld is obtained.

914,332 and 914,333, Mar. 2, 1909. MANUFACTURE OF TUBES. Otto Briede of Benrath, Germany. The invention is a method of rolling thin walled tubes over a mandrel so that the mandrel will not adhere to the tube. This is accomplished by so adjusting the rolls that one side of the tube is slightly pushed away from the mandrel while the rolling operation is going on. The rolls are left slightly out of alignment for this purpose.



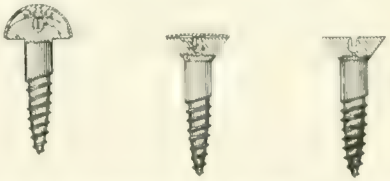
915,673, Mar. 16, 1909. MACHINE FOR THE MANUFACTURE OF TUBES FROM METAL STRIPS. Nicolaus Heid of Stockerau, near Vienna, Austria. A machine for making the so-called spiral tubing from metal strip and which is now extensively used on automobiles and other appliances.

914,520, Mar. 9, 1909. BEARING. Frederick W. Salmon of Burlington, Iowa. A water-cooled bearing in which babbitt-metal is used. The construction of the bearing is herewith shown. Copper tubing is imbedded in the bearing. The object of the construction is to prevent a heat-insulating film of oil from getting between the babbitt-metal and the copper coil.



914,783, Mar. 9, 1909. SAND-BLAST MACHINE. Francis P. Boland of Providence, R. I. An improved sand blast in which the modifications are in the air and method of feeding. The mixing head or chamber has also been improved.

915,068, Mar. 16, 1909. ORNAMENTAL CAP FOR SCREWS AND OTHER FASTENINGS. Robert S. Bowen of Newton, Mass. The method of producing an ornamental head on a screw as shown in the illustration. The slot is made larger at the bottom so that the cap will not pull out.



915,029, Mar. 9, 1909. PROCESS OF DETINNING. F. Von Kugelgen and Geo. O. Seward of Holcombs Rock, Va. Assignor to the Tin Products Co., of New York City. The method of removing tin from tin plate scrap by means of dry chlorine gas. The feature of the patent lies in keeping down the temperature of the container, in which the scrap is placed, so that the iron is not attacked as it is when the temperature is high.

Trade Items.

The Federal Brass Foundry, recently organized at Elkhart, Ind., has moved to 319 Hydraulic Ave., South Bend, Ind., where they have equipped their plant with Steele-Harvey brass melting furnaces.

The Morton B. Smith Co. of New York City, the well known metal dealers, have enlarged their warehouse in New York City by taking additional room at 241 Front St. adjoining their present building.

The Bowen Mfg. Co. of Auburn, N. Y., manufacturers of oil cups, are now operating crucible melting furnaces in connection with their regular line of work and are making brass ingot-metal for the trade. They are now able to utilize the brass chips which they make in making oil cups from brass rods.

On and after April 12, the main office of the American Manganese Bronze Company will be located at their works at Holmesburg, Philadelphia, Pa. where all correspondence should be addressed. The New York office at 99 John St. will still be retained as a sales office and the treasurer of the company, W. A. Locke, will be at this office on Thursday of each week.

Owing to the large increase in their business the Bridgeport Electroplate Company of Bridgeport, Conn., have found it necessary to obtain larger quarters and will shortly move to the factory formerly occupied by the Challenge Cutlery Co. on Kossuth St. This new factory will give them greatly increased facilities and a considerable amount of new equipment will be needed.

Concerns carrying on polishing should investigate the merit of the polishing wheel made by the Springfield Tire & Rubber Company of Springfield, Ohio, as the wheel which they manufacture is of unique construction. It consists of a flexible rubber bond in which the polishing material is imbedded so that a flexible wheel is obtained with all the advantages, and at the same time a solid wheel is produced so that the life of the wheel is long. In other words all the advantages of the emery wheel are obtained, together with the flexibility of a felt or other material used for making wheels of this kind.

The Williams Typewriter Company of Derby, Conn. manufacturers of typewriters, are now in the hands of a receiver and the plant is being operated by him.

The new addition to the plant of the Buffalo Copper and Brass Rolling Mill will be 144 x 178 feet of one story and steel roof. New brass rolling machinery will be added which will be driven by electric motors. The electric power is obtained from Niagara Falls.

The United Metal Mfg. Co., 525 West 26th St., New York City have started a brass foundry at their works and it is now in full operation. Owing to insurance requirements, they are obliged to operate their furnaces with gas instead of oil as at first contemplated.

The Springfield Facing Company of Springfield, Mass., manufacture high grade foundry facings for brass foundry use. One of their specialties, which never fails to give the best of satisfaction, is "Brown's Celebrated Charcoal Facing''. They also make many other kinds of foundry supplies, such as plumbago facings, core washes, and are also one of the largest dealers in charcoal in the United States.

The Standard Underground Cable Company of Perth Amboy, N. J. are now manufacturing brass wire in addition to their regular product of copper wire. At present they are making large quantities of pin-wire, fly-screen wire and other fine sizes. The wire is made by hot rolling a 4 in. square billet to ⅜ in. rod and then drawing in the usual manner. Continuous machines are used for drawing after the wire reaches the fine sizes.

It is reported that a meeting was recently held in Paris by Edward Brush, vice-president of the American Smelting & Refining Co., B. Hochschild of the American Metal Co., and representatives of Merton & Co. of England and Aron Hirsch and Sohn of Halberstadt, Germany, for the purpose of restricting the production of pig lead should the market value fall below a minimum price. The concerns represented practically control the lead production of the world and it is probable that the effect of this conference will soon be manifest.

The American Seal Company are now manufacturing lead car seals at their works recently started on Union Ave., Bridgeport, Conn.

The Mount Holley Iron Works, Mount Holley, N. J., are to erect a new brass foundry for the manufacture of plumbers' brass goods.

C. W. Leavitt & Co., 30 Church St., New York City, solicit inquiries for aluminum ingots for immediate or future delivery. They are prepared to quote attractive prices for this material and no one should purchase aluminum without first obtaining their price.

It is reported that the plant of the Cheshire Brass Co., at West Cheshire, Conn., recently destroyed by fire will be rebuilt. The casting shop was not destroyed and it is now in operation and the cast metal is being rolled for them by the Waterbury Rolling Mills of Waterbury, Conn.

The Union Equipment & Bronze Company, 1901 Park Ave., New York City, are now manufacturing "Billikens" of solid bronze and plated white metal. The fad for using "Billikens" on automobiles as an emblem of good-luck has created a demand for this class of work. The company are making them under license from the Billiken Company of Chicago, Ill.

The Nelson Valve Company, Chestnut Hill, Philadelphia, Pa., will make some very extensive improvements within the next few months, and much new equipment will be installed. Among the new buildings to be erected is a brass foundry, 48 x 250 feet, and a brass finishing shop of the same size. A chemical and testing laboratory will also be installed. Steam metal valves are manufactured, but plumbers' brass goods will also be made when the improvements are completed.

The recent report of the American Brass Company of Waterbury, Conn., showed a decrease in net earnings for the year 1908. The earnings of this company since 1904 were as follows: 1905, $1,335,976; 1906, $2,265,708; 1907, $1,303,240; 1908, $1,037,518. One of the interesting features of the report is the fact that a valuation of only $1,000 is placed upon the patents owned by the company. A deduction of $100,000 has been made each year for the depreciation of plant. The capital stock of the company is $5,550,000.

The Miller Pasteurizing Machine Company of Canton, Ohio, manufacturers of sterilizing machinery, are equipping a brass foundry for making their own brass castings.

The High Mold Art Company has been organized and started in Mount Vernon, N. Y., to manufacture silver deposit and silver plated wares. Bernhard Nordblom, formerly plater for the Mauser Mfg. Co., of that city, is connected with the company.

The Hawkins Co., of South Britain, Conn., who have built a plant for the manufacture of seamless brass and copper tubing under the direction of Ferdinand Deming, recently commenced melting for the purpose of casting tube shells for drawing into seamless tubes, but are not yet ready for manufacturing. The plant is still in the experimental stage.

If one does not believe that a "sponge-plater" is a useful appliance, he should try it and be convinced. Kendrick & Davis of Lebanon, N. H., are manufacturing a sponge-plater of unique design. It consists of rubber bulb in which the solution is held and which serves to constantly keep the sponge saturated. The work to be plated is connected with the cathode wire from a dynamo or battery, and the end of the sponge-plater is connected with the anode wire. When the sponge is applied to any surface, it becomes electroplated. Gold, silver, copper, nickel or brass may be plated with it and there are so many uses for it that they are almost too numerous to mention.

The Hanson & Van Winkle Company, Newark, N. J., are now placing upon the market their new "Independent Spindle Polishing and Buffing Lathe" which has many novel features. It dispenses with a countershaft and has two spindles driven by one belt. It may be stopped or started at either end. The clutches are of forged steel and the cones are of the double friction type. A hand lever is used to throw the clutch in or out. The object of the machine is to allow wheels to be changed whenever desired and without interfering with the other end of the lathe or the polisher working at it. Customers claim a saving of fifty hours per month. The lathe may be belted either from above or below. All the bearings are babbitted and ring oilers are used.

[illegible] Murray has leased the needle shop building in New Britain, Conn., and is equipping it as a jobbing brass foundry.

The Standard Enameling and Plating Company, 136 Orange St., Providence, R. I., are now doing a general jobbing plating business in addition to their other line of work .

Dunn & Rodenberg of Providence, R. I., manufacturing jewelers, have installed a complete coloring and plating plant in their establishment.

The name of the Comstock Brass Foundry Company of Cleveland, Ohio, has been changed to the National Bronze & Aluminum Foundry. C. W. Comstock has severed his connection with this company and has been succeeded by J. H. Shafner, formerly connected with the Allyne Brass Foundry. The president of the company is M. Komito.

The Hardwick-Abbott Mfg. Co., have been incorporated at Dallas, Texas, with a capital stock of $20,000 and will start a brass foundry in connection with their iron foundry and machine shop. This concern is a consolidation of the Greenville Foundry & Machine Co., of Greenville, Texas, and the Machinery Mfg. Co., of Dallas.

Thomas McWilliams, 237 Eddy St., Providence, R. I., manufactures steel rolls from 1 to 10 inches in diameter for rolling all kinds of metals and has supplied many of the largest manufacturing jewelers in the United States. He also manufacturers draw-benches, rotary shears, ingot molds, and many other tools and machines needed in metal working. When in need of small rolling mill machinery, either for jewelry manufacture, silverware or any similar lines, he is prepared to supply what is needed.

The "Hascoline Burnishing Compound" for use in tumbling small metal goods with steel balls to polish them, is giving excellent satisfaction for this work. When used, the work is not tarnished nor the balls attacked. This compound is made by Haas Bros. Co., 601 Union Bldg., Newark, N. J. They also make a material for cutting down steel or other metal work before tumbling with the balls. It is an excellent material for the purpose as it prepares the work for the steel balls so that they receive the highest possible finish.

The Ensign Mfg. Co., of Waltham, Mass., manufacturers of adding machines, will erect a new plant at Brighton, Mass.

The National Art Metal Company has been incorporated at Danvers, Mass., with a capital stock of $100,000 to manufacture art metal wares.

The Montrose Metal Casket Company of Philadelphia, Pa., which recently purchased the plant formerly occupied by the Pope Mfg. Co. at Hagerstown, Md., are making extensive alterations in order to render it one of the most modern plants for the manufacture of this class of goods. An oil burning system is being installed by Tate, Jones & Co. of Pittsburgh, Pa.

The name of the Fahys Watch Case Company of Sag Harbor, N. Y., has been changed to Joseph Fahys & Co., and the capital stock has been increased to $5,000,000. Watch cases are manufactured by the company and in addition they carry on the production of sterling silver wares, both flat and hollow, under the name of the Alvin Mfg. Co. A line of plated ware is also manufactured.

The Manville Bros. Co., of Waterbury Conn., manufacturers of foot presses and automatic machines, announce that they have purchased from the receiver of the Cross & Spiers Machine Co., of that city, all of the drawings and patterns of their entire line of machinery and will be able to supply the trade with the full line which the Cross & Spiers Machine Co. manufactured.

The U. S. Indestructible Gasket Co., 15 South William St., New York City, are making gaskets from their new metal called "Indestructibleite," which will not melt or even scale at a temperature of 2500 degrees F. The metal is practically non-corrosive. They also sell the metal for general purposes in sheet form where a non-corrosive material is desired, which will stand a high temperature.

The Orford Copper Co., 43 Exchange Place, New York City, producers of "Monell-Metal," the nickel and copper alloy that is now creating so much interest, state that they are prepared to sell ingot metal only to the trade. The sheet metal is rolled by the American Sheet & Tin Plate Co., of Pittsburg, Pa., and castings are made by Isaac G. Johnson & Co., of Spuyten Duyvil, N. Y.

The Loomis Brass Foundry has been incorporated at Akron, Ohio, with a capital stock of $10,000 to make brass castings.

The Iowa Stove & Range Co., has been incorporated at Waterloo, Iowa, to manufacture stoves and ranges. The new company succeeds the Cascaden Mfg. Co.

The new plant of the Columbus Auto Brass Co., recently incorporated at Columbus, Ohio, with a capital stock of $10,000 will be located at 181 West Maple St. Brass parts for automobiles will be made as well as spinning and polishing. G. Edwin Smith is president; C. E. Roth, secretary and treasurer; and Roy Coffman, superintendent.

Otto Blesch, metal smelter and refiner has moved from Clark Ave. and Wabash R. R. to his new works at 19th. St. and West Jefferson Ave., Detroit, Mich., where he has a large and up to date plant for handling brass foundry refuse. As will be noted from his advertisement, he has purchased the entire foundry equipment of The Standard Sanitary Mfg. Co. of Detroit and offers it for sale at less than half its cost. This is a good opportunity to obtain brass foundry equipment at very attractive prices.

The "Ottoman Brand" of emery, and emery wheels made from it, have proved so satisfactory and so much work can be obtained from them, that the manufacturers, H. A. Stiles & Co., 176 Federal St., Boston, Mass., guarantee and will prove at their own expense, that more work and better results can be obtained from 1 lb. of "Ottoman Brand" pure Turkish emery, than from 1 lb. of any other brand. Under such conditions, consumers of emery and emery wheels should give these products a trial.

At the annual meeting of the National Association of Brass Manufacturers, held in St. Louis, Mo., on March 15, 16 and 17, an organization of the manufacturers of plumbers' brass goods, the following officers were elected: President, Joseph Glauber, of the Glauber Brass Company of Cleveland, Ohio; Commissioner, W. M. Webster of Chicago, Ill.; Trustees, A. D. Saunders and E. F. Niedecken of Milwaukee, Wis., A. A. Deutsch of Cleveland, Ohio, A. S. Hill of Haydenville, Mass., and Fred Somerville of Toronto, Canada.

A new brass foundry will be built by J. H. Johnson at Eau Claire, Wis.

The R. P. K. Pressed Metal Company has started in business in Bridgeport, Conn., to make small metal stampings. The factory is located at Howard Ave. and Spruce St.

The new brass foundry of the Stier Brass Foundry of Dayton, Ohio, is now in operation. The general manager is Herman A. Stier formerly connected with the Miami Brass Foundry Co. The plant is located at Keowee and Herbert Sts.

The Acme Wire Mfg. Co. of New Haven, Conn. are equipping a chemical laboratory, at their works on Whitney Ave., for experimental work. It will be in charge of Richard Tilney. This company are now manufacturing insulated copper wire with enamel insulation.

When in need of wood or metal patterns or models of any kind, manufacturers should correspond with the Bridgeport Pattern & Model Co., 143 Cannon St., Bridgeport, Conn. Their facilities are second to none and estimates will cheerfully be submitted upon receipt of drawings. Valve work and plumbers' brass goods patterns are specialties of this company and their workmen have had long experience in making this class of work.

The Wireless Electric Appliance Company have been organized at Grand Rapids, Mich., with a capital stock of $500,000 to manufacture generating batteries and wireless electric lamps. The products of this company are quite unique and it said that some interesting products in the wireless line will be produced. A plant will be erected. The goods will be manufactured under the patents of Philip Young.

Personal.

F. P. Davis, formerly with the Florence Mfg. Co. of Florence, Mass. is now representing the Celluloid Zapon Co. in the West.

Royal F. Clark has accepted a position as foreman plater with Thos. J. Dunn & Co., of New York City.

Thomas F. Jordan has resigned his position as foreman of the plating department of the Edward Miller Company of Meriden, Conn.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Acetone, pure, 98-99%	lb.	.22
Acid, Acetic, pure, 30%	lb.	.07
Acid, Arsenious (White Arsenic)	lb.	.20
Acid, Benzoic	lb.	.55
Acid, Boracic (Boric), pure	lb.	.12
Acid, Hydrochloric, see Acid, Muriatic		
Acid, Hydrofluoric, 30%	lb.	.04
Acid, Hydrofluoric, 50%	lb.	.10
Acid, Muriatic, 20°	lb.	.02
Acid, Muriatic, c.p., 20°	lb.	.07
Acid, Nitric, 38	lb.	.05¾
Acid, Nitric, 40	lb.	.05⅞
Acid, Nitric, 42	lb.	.06¼
Acid, Nitric, c.p.	lb.	.08
Acid, Sulphuric, 66	lb.	.01¾
Acid, Sulphuric, c.p.	lb.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	lb.	.04
Aluminum, Sulphate	lb.	.06
Aluminum, Metallic, in ingots	lb.	.24
Aqua Fortis, see Acid, Nitric		
Ammonia Water (Aqua Ammonia), 20	lb.	.04¾
Ammonia Water (Aqua Ammonia), 26	lb.	.06¼
Ammonia Water, c.p.	lb.	.08
Ammonium Carbonate, lump	lb.	.15
Ammonium Chloride (Sal Ammoniac)	lb.	.12
Ammonium Hydrosulphuret	lb.	.50
Ammonium Sulphate	lb.	.07
Ammonium Suphocyanate	lb.	.50
Amyl Acetate	gal.	1.85
Antimony	lb.	.07⅞
Antimony Chloride (Butter of Antimony)	lb.	.23
Arsenic, Metallic	lb.	.15
Arsenic, White (Acid Arsenious)	lb.	.20
Argols, White (Cream of Tartar)	lb.	.31
Asphaltum, Commercial	lb.	.05
Asphaltum, Egyptian (Bitumen)	lb.	.30
Benzine	gal.	.20
Benzol, Pure	gal.	.75
Bismuth, Metallic	lb.	1.75
Bitumen, see Asphaltum.		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	lb.	.10
Borax Glass	lb.	.35
Cadmium, Metallic	lb.	.75
Carbon Bisulphide	lb.	.10
Calcium Carbonate (Precipitated Chalk)	lb.	.10
Chrome-Green	lb.	.50
Copper, Lake (cask)	lb.	.13¼
Copper, Lake (carload)	lb.	.13
Copper, Electrolytic, (Carload)	lb.	.12¾
Copper, Electrolytic (cask)	lb.	.13⅛
Copper, Casting (carload)	lb.	.12½
Copper, Casting (cask)	lb.	.13
Copper Acetate (Verdigris)	lb.	.35
Copper Carbonate, dry	lb.	.25
Copper Sulphate (Blue Stone)	lb.	.09
Copperas, see Iron Sulphate.		
Corrosive Sublimate, see Mercury Bichloride.		
Cream-Tartar, see Potassium Bitartarate.		
Cryolite	lb.	.12
Cyanide, see Potassium Cyanide.		
Dextrin	lb.	.15
Emery Flour	lb.	.04
Emery, F F & F F F	lb.	.03
Flint, powdered	lb.	.01
Fluor-Spar	lb.	.01¼
Fusel Oil	gal.	1.75
Gelatine, Nelson's	lb.	1.15
Gold Chloride	dwt.	.60
Gum Copal	lb.	.30
Gum Damar	lb.	.30
Gum Elemi	lb.	.70
Gum Guaiacum	lb.	.26
Gum Mastic	lb.	.70
Gum Sandarac	lb.	.35
Gum Shellac, brown	lb.	.50
Gum Shellac, white	lb.	.60
Iron Perchloride	lb.	.25
Iron Sulphate (Copperas)	lb.	.05
Lead Acetate (Sugar of Lead)	lb.	.15
Lead, Pig	lb.	.04½
Lead, Red	lb.	.12
Lead, Yellow Oxide (Litharge)	lb.	.12
Liver of Sulphur, see Potassium Sulphide.		
Manganese, Ferro, 80%	lb.	.10
Manganese, Metallic, pure	lb.	.75
Magnesium, Metallic	lb.	1.25
Mercury Bichloride (Corrosive Sublimate)	lb.	.93
Mercury, Metallic (Quick Silver)	lb.	.89
Mercury Nitrate	lb.	1.50
Mercury Oxide, yellow	lb.	1.80
Nickel and Ammonium Sulphate (**Double Salts**)	lb.	.16
Nickel Carbonate, dry	lb.	.60
Nickel Chloride	lb.	.50
Nickel, Metallic	lb.	.47
Nickel Sulphate (Single Salts)	lb.	.25
Nitre (Saltpetre), see Potassium Nitrate.		
Oil, Palm	lb.	.08
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	lb.	.15
Pearlash, see Potassium Carbonate.		
Phosphorus, yellow	lb.	.40
Phosphorus, red	lb.	1.10
Pitch	lb.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	12.50
Platinum, Metallic	oz.	23.50
Potash by Alcohol, in sticks	lb.	.50
Potash, Caustic (Potassium Hydrate)	lb.	.08
Potassium Bichromate	lb.	.14
Potassium Bitartarate (Cream of		
Potassium Carbonate (Pearlash)	lb.	.10
Potassium Chlorate	lb.	.15
Potassium Cyanide	lb.	.25
Potassium Iodide	lb.	2.25
Potassium Nitrate (Nitre or Saltpetre)	lb.	.10
Potassium Permanganate	lb.	.17
Potassium, Red Prussiate	lb.	.60
Potassium, Yellow Prussiate	lb.	.24
Potassium Sulphide (Liver of Sulphur)	lb.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	lb.	.70
Tartar)	lb.	.31
Pumice, Ground	lb.	.05
Quartz, Powdered	lb.	.01
Rosin, Yellow	lb.	.04
Sal-Ammoniac, see Ammonium Chloride.		
Sal Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Fine	oz.	.50¼
Silver Nitrate, crystals	oz.	.50
Soda-Ash	lb.	.05
Silver, Fine	oz.	50¾
Sodium Biborate, see Borax.		
Sodium Bisulphite	lb.	.15
Sodium Carbonate (Sal-Soda), crystals	lb.	.02
Sodium Hydrate (Caustic Soda)	lb.	.05
Sodium Hydrate (Caustic Soda) by **Alcohol (in sticks)**	lb.	.45
Sodium Hyposulphite ("Hypo")	lb.	.04
Sodium, Metallic	lb.	.90
Sodium Nitrate	lb.	.05
Sodium Phosphate	lb.	.09
Sodium Silicate (Water Glass)	lb.	.04
Soot, Calcined	lb.	.15
Spelter, see Zinc.		
Spermacetti	lb.	.40
Sugar of Lead, see Lead Acetate		
Sulphur (Brimstone), in lump	lb.	.05
Tin Chloride	lb.	.48
Tin, Metallic	lb.	.29½
Turpentine, Venice	lb.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water-Glass, see Sodium Silicate.		
Wax, Beeswax, yellow	lb.	.45
Wax, Carnauba	lb.	.70
Wax, Japan	lb.	.20
Whiting (Ground Chalk)	lb.	.02
Zinc Carbonate, dry	lb.	.19
Zinc Chloride	lb.	.12
Zinc Sulphate	lb.	.06
Zinc (spelter)	lb.	.04⅞

THE
BRASS WORLD
AND
PLATERS' GUIDE

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Why Valve Castings Leak when Tested.

The leakage of valve castings when tested by pressure is one of the exasperating difficulties of valve manufacturers. When good steam metal is used for the mixture, the leakage may run all the way from 3 or 4 per cent in the best managed establishments, and up to 15 or 20 per cent in those not so well conducted. It is always a factor of uncertainty and is consequently annoying.

There are several causes which may result in the leakage of steam metal valve castings:

1. The metal mixture. The presence of too much zinc is a detriment as it produces dross on the melted metal. Aluminum is a very flagrant cause of leakage, and when scrap is used, this metal is apt to creep in.

2. The sulphurizing of the metal. When the fuel used for melting contains an excess of sulphur, the metal absorbs it. Sulphurized metal is always dirty and the dirt or dross becomes entangled in the molten metal, remains there when it sets, and thus forms a channel through which liquid or air may pass when pressure is applied.

3. Blowholes in the castings. Overheating metal or allowing it to remain in the furnace for some time after it has been melted causes gas absorption with the accompanying blowholes. Pinholes are small blowholes. These castings allow water or air to pass and the casting [illegible]

4. Use of too short a gate or runner in casting. In casting steam metal, there is always a certain quantity of dross formed. If it passes into the casting on account of the shortness of the gate or runner, leaky results. Owing to the desire of valve makers to have as little scrap as possible, the patterns are often made with shorter gates and runners than is admissible for good practice. It is quite a frequent source of leakage in valve castings.

5. Too thin walls in the valve. While not an intentional error on the part of the valve maker, it frequently happens that the core box is not properly made, or not well set in the mold. The result is a casting with one thick side while the other is quite thin.

6. Use of inferior scrap. While the scrap may be of the right mixture, its condition will often cause leakage. For example, chips alone are unsuited for melting as they oxidize to such an extent that the metal becomes filled with dross. To use them, they should be melted and first run into ingots. If this is not done, a certain percentage only should be employed. The best results, however, are obtained by first running into ingots.

7. Pouring the metal too cold. When steam metal is not poured at a sufficiently high temperature, the film of oxide, which always forms upon exposure to the air, becomes entangled in the metal and remains there. The casting may then have a good appearance, and the oxide be invisible to the naked eye; but nevertheless, it forms a channel through the metal to cause leakage. When the metal is poured at a suitable temperature, the zinc burns on the surface of the stream, and apparently acts as a reducing agent, for there is then no film which forms to become entangled.

Pouring the metal too cold is probably the chief cause of leakage in steam metal valve castings. The use of too short a gate or runner undoubtedly is the next in importance

Until quite recently practically all vanadium was obtained from Spanish lead ores containing about 5 per cent of oxide of vanadium. A deposit has since been opened up in South America which contains, after calcining, about 10 per cent of oxide of vanadium. It is said to be the most important source of vanadium.

The Foundrymen's Convention.

The convention of the American Foundrymen's Association and the American Brass Founders' Association, which takes place during the week commencing May 17, will undoubtedly be one of the most interesting and largely attended of any convention yet held. A large number of exhibits of foundry appliances, furnaces and equipment will be made. Among the papers to be read are the following:

"The Manufacture of Brass Ingots, Their Uses and Advantages," by W. M. Corse.

"The Use of Waste Heat," by F. W. Reidenbach.

"The Patent Situation in the United States Respecting Alloys," by G. H. Clamer.

"General Principles of Operation of Industrial Pyrometers," by C. H. Wilson.

"Notes on Brass Melting," by Chas. T. Bragg.

"Melting of Brass Turnings in the Oil Furnace," by J. H. McVeen.

"Electrolytic Assay of Copper," by Geo. L. Heath.

"A System of Distributing Waste Losses in Raw Materials to the Cost of the Finished Prodrct," by L. W. Olsen.

"The Tensile Strength of Zinc Aluminum Alloys," by W. D. Bancroft.

Tungsten has nearly the specific gravity of gold. That of gold is 19.3 and tungsten is 18.7.

According to recent determinations, the melting point of platinum is given as 3187 degrees F., and palladium as 2815 degrees.

Cast iron to be electroplated gives better results if sand-blasted before plating instead of pickling it. It is then less apt to "spot out."

According to Moissan, titanium is the most infusible metal. It is even more infusible than vanadium and melts at a very much higher temperature than pure chromium, tungsten, molybdenum or zirconium.

The Use of Artificial Graphite in Making Permanent Molds.

Now that artificial graphite can be obtained in large, flat pieces of a hard and homogeneous nature, its value for making permanent molds of certain kinds is worthy of serious consideration. While the subject is a new one, and only a limited amount of work has been done along the line, the possibilities are greater than would at first be imagined.

Graphite, as well known, is an allotropic form of carbon of which charcoal and the diamond are other forms. The term *allotropic* means that graphite, charcoal and the diamond are chemically the same, but that they differ in their physical properties. They are all forms of carbon. Edward G. Acheson of Niagara Falls made the discovery that when powdered charcoal or coke (known as amorphous carbon) is compressed and heated to a high temperature in an electric furnace, it becomes changed into graphite and the form of the article is preserved. By the use of pure carbon as the base material, the graphite so produced is pure. The process of making artificial graphite in this manner proved of much value and the International Acheson Graphite Co., of Niagara Falls was formed to produce it upon a commercial scale and they are now the only ones in the United States who make it.

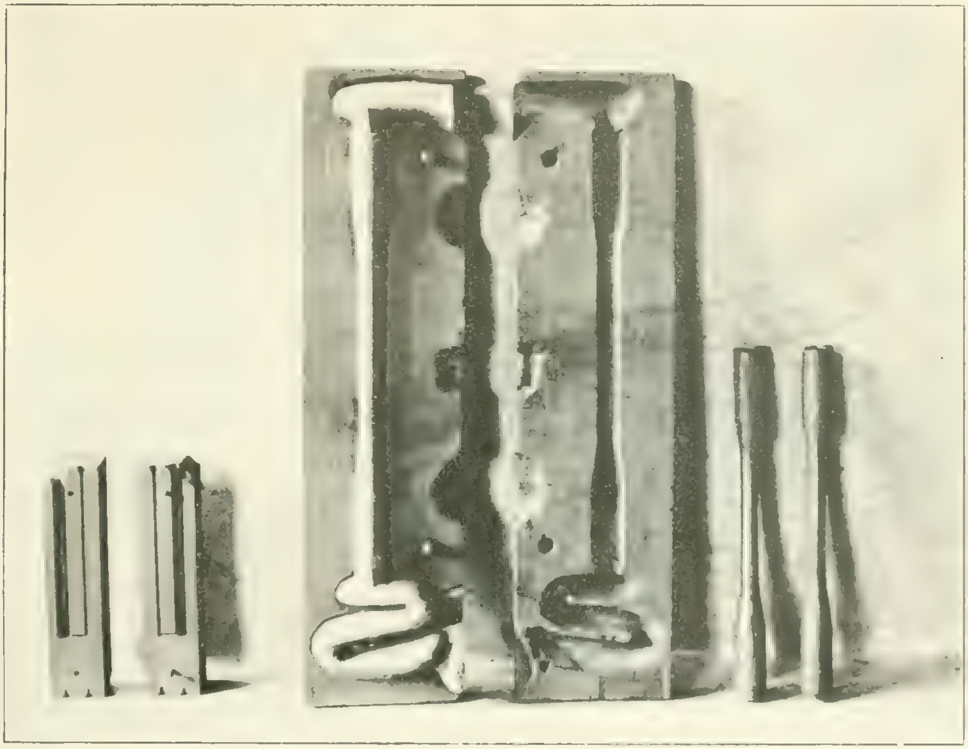


Fig. 1. Molds of Artificial Graphite Showing Method of Making and Castings Produced in Them.

As the artificial graphite takes the form of the carbonaceous material used for converting into it, various forms may be produced, but of simple shape. Plates and rods are the standard shapes and may be obtained in any reasonable size and homogeneous and sound. No binder is used to hold the graphite together and it is perfectly pure and compact.

It is a somewhat widely [illegible] belief that

that blocks of artificial graphite are made by mixing the powdered material with a binder and then compressing the mass and perhaps, baking it. This idea is wrong. The graphite is made solid and then cut into the desired shape. Were it put together with a binder, its value for the majority of uses for which it is employed, would cease. In Fig. 2 are shown some pieces of artificial graphite as they occur in commerce. Slabs of large size and rods of a similar nature as illustrated, are now a commercial product.

The slabs of graphite used for making a mold are received sawed to *rough* or *exact* shape. The surfaces are rarely flat enough for use and the first operation in making the mold is to make the faces of each half as flat as possible and so that they fit together as tightly as possible. Artificial graphite cuts readily and it may be scraped or planed with a wood plane or on a metal planer. For large pieces, the planer is preferable as it leaves the slab flat and true. If any ridges are left on the faces of the slabs, they are readily removed by a flat block of wood to which a piece of sandpaper has been glued. This is rubbed over the surface.

When the halves of the mold have been made flat, the pins should be inserted. The object is to make the cope and nowel of the mold so that it can be taken apart and put together again with accuracy. The two slabs are clamped together and four holes are drilled through, one hole in each corner. They are drilled clear through both slabs and in places that will not interfere with the mold itself.

For the pins of the mold, the graphite rods may be used or those of brass or iron will answer in some instances. For very high melting metals it is usually desirable to use the graphite rods for the pins as the mold can then be heated very hot, if desired, before pouring. The selection of the pins, therefore, is a simple matter and is easily adjusted.

As graphite has a greasy surface, the pins must be fastened in by cutting a thread on them. The holes in one half of the mold are tapped out with a coarse thread, and the rod with a corresponding thread for a portion of its length sufficient to enter the hole. The ends of the rods are tapered so as to enter the other half of the mold readily. The pins thus made are firmly screwed into the holes, and then those in the other half are reamed out, if found necessary, to produce an easy fit without looseness.

The mold is now ready for sinking the design in it. Let it be assumed that test bars like those shown in Fig. 1 are to be cast. The surface of the mold must actually be cut out with a gouge, drilled, planed or otherwise routed. One would naturally think that such an operation would hardly pay, or that it would limit the usefulness of the mold to quite narrow lines. To be sure, the mold is limited in its adaptability, but there are certain places where it can be employed with excellent advantage. As far as the cutting is concerned, it is an easy operation. The graphite cuts very readily, and as it contains no grit of any kind, the tools remain sharp for some time. It is free from grain and hence does not split like wood, nor is it as difficult to cut as regular graphite crucible mixture on account of the sand and clay which the latter contains. When artificial graphite is cut, the tool is actually lubricated by the particles, thus rendering the operation an easy one.

When one tries to cut out an artificial graphite mold, he will be surprised at the ease with which it takes place. The design should first be laid out on both halves of the mold. It is then cut out by any desired method, the gate is likewise cut and the mold is ready for use. Undercut work, of course, cannot be done in molds of this kind, nor are they intended for fancy designs where a large amount of labor is required in sinking; but for many simple shapes where the mold is to be used continuously, they are useful. It is not a costly matter to cut out the mold for ordinary shapes and it will last a long time with care. It may be of interest to say that plenty of draft must be given the mold in order to avoid breaking the edges when the casting is removed.

It is believed that artificial graphite offers a new field for the manufacture of permanent molds for casting metals. The graphite is not acted upon by any metal and does not adhere to it so that the castings leave the mold without difficulty. While graphite itself is not a non-conductor of heat, it is sufficiently poor to allow metal to be cast in it without the chilling that takes place in a metal mold. Another great advantage of the mold is that it may be heated to any desired temperature before casting the metal in it and thus its running is insured. For casting metals with a high melting point, this property is valuable.

Those who contemplate using molds of artificial graphite must first consider whether they are adapted to their work. Many persons will undoubtedly be disappointed in them, while others will find them of service. Like all new products it must be tried before legitimate uses can be found. In connection with molds of this material, E. A. Colby, the well known metallurgist of Baker & Co., of Newark, N. J., platinum, gold and silver manufacturers, makes the following statement:

"It has been customary for many years, as doubtless known, in the casting of such metals as gold and silver, to use iron molds which, just previous to pouring of the metal, are coated either with lampblack or a film of oil to prevent the molten metal from adhering to the walls of the mold. It occurred to me that graphite, of the artificial quality, would constitute an excellent substitute for metal and avoid the use of a lubricant, without rapid disintegration of the graphite.

"My experience thus far has fully confirmed my expectations, and I find the graphite not only to offer the advantage of resisting high temperatures with scarcely any oxidation, and to yield an ingot having a smooth and bright surface; but that in addition to all these advantages, the graphite, by reason of the ease with which it can be machined, enables one to produce ingots in a variety of forms. So far as I know, this particular use of artificial graphite is new, and I have yet to find any case in which there is any absorption of the graphite by the molten metal, and I am inclined to think that there is a slight advantage in the use of this material for molds, inasmuch as the graphite would act as a reducing agent to oxides on the surface of the metal as it is being poured."

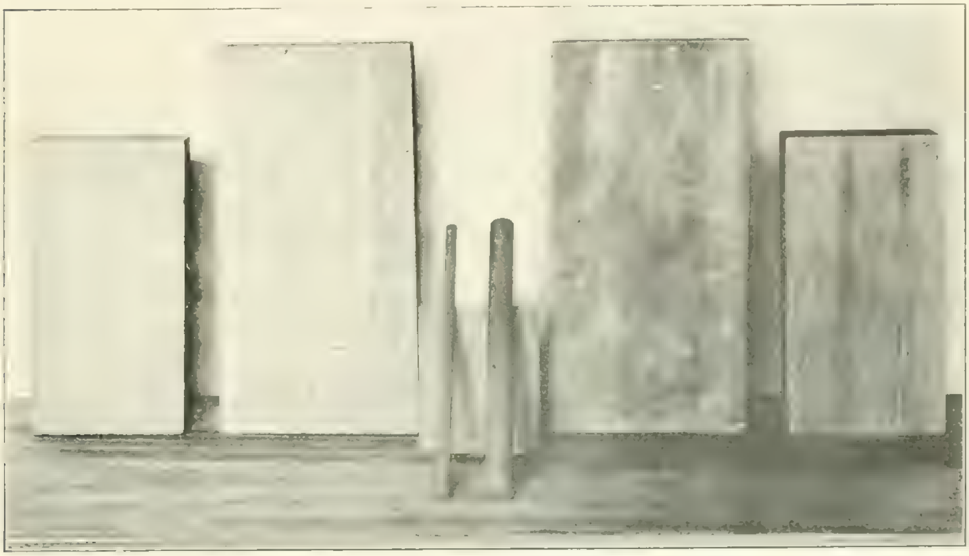


Fig. 2. Slabs and Rods of Artificial Graphite as Made in the Electric Furnace.

The brass figureheads on American men of war are to be removed. This decision has been reached at the Navy Department after long consideration. The figureheads are usually made of brass and they shine brightly in the sun. This destroys the efficiency of a ship in time of peace manoeuvres, as a vessel can be much more easily seen. In time of war the ornaments are painted. Then too the cost is an important consideration. The figurehead on the Olympia cost something more than $12,000. It was designed by Saint Gaudens and it is to remain, as the Olympia is at the Naval Academy and will not participate in the manoeuvres.

Silver Plated Flatware in Europe.

Some reports on silver plated flat-ware in Europe have recently been made by a number of United States Consuls in the *Daily Consular Reports*. Robert P. Skinner, the Consul at Hamburg, Germany, makes the following report about silver plated flat-ware in Germany:

"A peculiarity of the silver-plated flat-ware turned out by the German manufacturers is that the goods are stamped so as to show the quantity of silver used in the plating. For instance, if a tablespoon or a fork is stamped with the figure "100," this indicates and serves as a guaranty on the part of the manufacturer toward the dealer, and by the latter toward the customer, that 100 grams (3.53 ounces) of silver have been used for plating 1 dozen tablespoons and 1 dozen forks. It is claimed that the public has become so accustomed to this method of guaranteeing the quality of the articles that it is difficult to sell silver-plated flat-ware not bearing such stamps: for instance, that of English make, although the latter is highly esteemed in Germany and appreciated as being not inferior in quality to its German rival. The English manufacturers only guarantee "first," "second," and "third" quality, and, my informant states, can not be induced to adopt the German method."

Consul Halstead of Sheffield, England, makes a very favorable report of American wares as follows:

"The designs of the American spoons at hand are most attractive. I have not seen any designs quite similar here, and think, perhaps, none are quite as pretty, certainly not any prettier; but Birmingham has a jewelers' and silversmiths' school, and special attention is being devoted to improving the designs of jewelry and silverware, so it can not be long before spoons equally attractive will be on the market."

Water-glass, for which the chemical term is silicate of soda, is made by fusing sand with carbonate of soda and then dissolving the fused mass in water. It forms a jelly like material resembling glass but soluble in water.

Agitating Nickel Solutions and its Good and Bad Features.

When any new process is proposed, there is always a certain class of people who are desirous of immediately discarding the old one for the new without seriously considering whether it is adapted for their purpose. This is true of the discussion that is now going on in regard to the use of agitated nickel plating solutions. While an agitated nickel solution is thoretically correct and is capable of giving a rapid and excellent nickel deposit, for some purposes, unless methods are entirely changed, the results will be bad instead of good.

In the first place, a nickel solution to be used in an agitated condition must be frequently filtered. It is well known that a large amount of slime accumulates in the bottom of a nickel plating tank, and unless this is carefully removed, it will settle upon the work when the solution is agitated. To frequently filter a solution greatly retards the work of the plating room.

Then, too, many platers attempt to agitate the solution by blowing a small stream of air through one end of the tank. It usually does not suffice to agitate the whole solution, and the results are consequently imperfect.

The object of an agitated nickel plating solution is to allow a more rapid deposition of nickel than can be obtained in a still one, but if good results are obtained in a still solution it is frequently unwise to attempt to agitate it as the expense and annoyance are such that they scarcely balance the increase in the quality of the nickel deopsit, if, indeed, any is obtained.

Before attempting to install an agitating apparatus, one should first ascertain whether it is really necessary and what is to be gained by it. It can safely be said that for the majority of work, a still solution is preferable.

According to recent researches made by Sieverts and Hagenacker, metallic nickel is capable of absorbing 15 per cent by volume of hydrogen gas when in a powdered form and heated to 900 degrees F. This fact accounts for the so called "burnt" nickel when too strong a current is used in electro-depositing it. The nickel is then apparently not oxidized but "hydrogenized."

The Production of the "Barbedienne" or Dark Brown Finish on Metals.*

Brown finishes on metallic surfaces are now very popular and goods with this color find ready sale. The finish is a pleasing contrast to the sombre black or the gaudy lighter colors. The French have always led in the production of artistic finishes and the attractive browns which have characterized many of their metal wares have always been the envy of art metal manufacturers. While there are many shades of brown that can be produced on metal goods, the one known as the *Barbedienne* brown is by far the most pleasing. It is the one which has a dark brown color with a slightly reddish caste. It is applicable for all classes of goods, either of solid bronze, brass, steel or iron, or soft metals.

Contrary to the usual belief, the finish is quite simple to produce. It is done cold, and applied with a brush so that no dip is required. This fact renders the process useful in applying the finish to large work which is difficult to treat in a dip. It is not expensive, although slightly more so than the simple liver of sulphur treatment, but the latter can scarcely be taken as a comparison as it is the cheapest known finish.

Upon solid brass, sheet-brass, bronze, and copper the finish is applied direct. Steel or iron, spelter and the soft metals must first be given a good heavy deposit of brass, bronze or copper. The brass deposit is preferable as it gives the best color tone. It must be borne in mind that, in giving these metals a deposit for the production of any finish of this character, where there is always a slight corrosion of the metal, a fairly heavy deposit must be put on or the base metal will be revealed after the operation of coloring has been completed.

To produce the *Barbedienne* brown finish, three materials only are necessary: Red sulphide of antimony, aqua ammonia and a soft brush.

The red sulphide of antimony is that produced by precipitating a solution of antimony such as the chloride of antimony or tartar emetic, by hydrogen sulphide gas. It is preferable, however, to purchase it and when this is done, care should be taken not to obtain the black sulphide as this will not work. The black sulphide is made from stibnite, a sulphide of antimony found as a mineral in nature. It is unsuitable for this purpose. The red sulphide is the material that must be used and it should be fine and dry. The ammonia used is ordinary aqua-ammonia of commerce and should not be too weak. As the commercial grade is usually so strong that it is disagreeable to use, a small quantity of water may be added to it if desired to lesson the smell. Any kind of soft brush will answer as the mass is painted on the surface of the metal to be colored.

Article with Barbedienne Brown Finish.

The metal to be colored should be clean and bright. The preparation must be as thorough as though it were to be electroplated. If greasy or stained, the color will be uneven. Solid brass or bronze work can be dipped or otherwise treated, and plated work can be colored immediately after it has come from the plating solution. The only requisite, therefore, is that it shall be clean and free from discoloration.

The red sulphide of antimony and the aqua ammonia are mixed together to make a rather thin paste so that it can be readily and thinly spread over the surface of the metal

---

*Also called "[illegible] [illegible] Brown."

If too thick more sulphide of antimony is used than is necessary and the coating is apt to be uneven. To be right, the mixture should spread about like thin paint.

The mixture of the red sulphide of antimony and ammonia is spread over the surface evenly and allowed to dry off. If the article upon which it has been applied is placed in a warm oven, like a lacquer-oven, the drying is hastened and the color seems to form rapidly; but it may, if desired, be allowed to take place in the air.

When the surface is *completely* dry it is covered with a red coating of sulphide of antimony. This is now removed by brushing the surface with a bristle or tampico brush. When the red powder is removed, the dark, brown color of the *Barbedienne* finish is revealed. When all of the powder has been brushed off, the surface may be lacquered or waxed as desired. A flat lacquer gives the best appearance to goods of this character.

Yellow brass seems to give excellent results when treated in this manner. Copper takes a slightly darker shade. Bronze has a shade intermediate between the two.

Some of the treatises on metal coloring recommend the use of powdered bloodstone with the sulphide of antimony, but experiments have shown that it is useless material and that there is no difference in the results when it is not used. Bloodstone is an oxid of iron which is not dissolved or even attacked by ammonia so that it is an inert substance. The use of sulphide of ammonia instead of aqua ammonia is also given in treatises on coloring, but this, too, has been found to give inferior results to the ammonia and is more difficult to use and obtain. The use of the red sulphide of antimony and aqua ammonia is all that is necessary.

For ordinary electroplating, a bronze solution should contain copper and zinc for producing a bronze deposit. It works better than one of copper and tin and is cheaper. Unless for some special work, tin is rarely used in a plating solution. The usual bronze employed for hardware and similar classes of goods where a bronze deposit is put upon steel or cast iron consists of 9 parts of copper and 1 part of zinc.

Alloying Copper and Iron.

When copper and iron are melted together in a crucible they apparently mix while melted; but on cooling, the two metals separate into layers. The copper contains a small quantity of iron and the iron has absorbed a small amount of copper. When an attempt is made to pour castings from such a mixture, the iron is found in the copper in the form of hard, steel nodules.

The difficulty is that the iron takes up carbon from the graphite crucible. The carbon serves to expel the iron from the copper. If the copper and iron be melted in a crucible which contains no carbon, and none is allowed to enter from the products of combustion, it is possible to make homogeneous alloys of copper and iron in all proportions which will roll into sheet or draw into wire without difficulty. There seems to be quite a field in this line and it is probable that there are many useful mixtures of these two metals heretofore unknown. According to investigators who have studied the subject, the alloying of copper and iron is only possible when free from carbon, but when none is present, it is readily carried out.

A Good, Medium-Price Babbitt Metal.

It frequently happens in the trade that a babbitt-metal is required intermediate between the well known genuine mixture and the cheapest grade in which nothing but lead and antimony is used. As the market price of tin is always high, genuine-babbitt metal, good material that it is, is often too expensive for many consumers to employ. The following mixture will serve in instances where an intermediate grade is desired:

Lead	50 lbs.
Tin	35 lbs.
Antimony	15 lbs.

This mixture has the advantage of containing no copper and, therefore, is easily made in an iron kettle. It will be found hard and an excellent metal. It is not only intermediate in price but in quality as well. It is actually better than the lead and antimony mixtures, and is only slightly inferior to genuine-babbitt. Many large machine builders now use it with good results, where genuine babbitt was formerly employed.

The Plastic-Bronze Patent Situation.

By G. H. Clamer.

Plastic Bronze is the name applied to copper-tin-lead alloys containing over 20% lead and less than 7% tin, as manufactured by the Ajax Metal Company.

In 1900 a patent was granted to the writer and J. G. Hendrickson for such a series of copper-tin-lead alloys in which the tin was below 7%, the lead above 20% and the balance substantially copper.

In the early days of railroading, copper and tin alloys were considered the standard mixtures for railway bearings. At first, alloys so high in tin as bell-metal (i. e., tin 15% to 20%) were used. This alloy was employed under the supposition that the harder the alloy, the more wear resisting were its properties. Such bearings were also recommended because of the well known fact that hard bodies move upon each other with less friction than softer ones. It was soon found, however, that these hard bearings gave considerable trouble. They were not sufficiently yielding or plastic to adapt themselves to the irregularities of the service; also excessive heating and gripment soon took place. Alloys were then made with lower tin content: first, with 12½% tin and finally with 10%. Bearings containing 10% tin and 90% copper remained the standard for a great many years, first, without the present almost universal practice of using lead linings, and after about the year 1870, with lead linings. It was about this year that patents were granted to Mr. D. H. Hopkins for attaching to bearings a thin lining of soft metal; the object being to make the bearings, as described in the patent specification, self fitting, the thin lining of this soft metal making it possible for the bearing soon to conform to the journal giving it, as it were, an automatic seat. The advantage to be derived from this invention was at once apparent, and the success of lead lined bearings was phenomenal, as railroads were quick to adopt them. The patents of Mr. Hopkins were declared valid by both the Eastern & Western Railroad Association and as a consequence, Mr. Hopkins for quite a period of time enjoyed almost a monopoly of the journal bearing business of this country. Mr. Hopkins during all this period adhered strictly to the copper and tin alloy for his bearings.

During this period Alexander Dick in England invented an alloy for bearings of copper and tin which contained lead. This was the first step toward the production of more plastic alloys for bearings outside of the previous mentioned reduction in tin. Both of these changes, i. e., the reduction of tin and incorporation of lead in the alloy, tended toward the production of more yielding or plastic alloys. The composition, 80% copper, 10% tin and 10% lead soon became largely used not only in England, but also in this country. In addition to these metals, there was also added to the alloy a small amount of Phosphorus (Approximately 1%), this alloy being known as "Standard Phosphor Bronze."

In 1892, Dr. C. B. Dudley, chemist for the Pennsylvania R. R., as a result of very carefully conducted and elaborate service tests, proved conclusively the following facts:

That rate of wear and tendency toward heating diminish with the diminution of tin and increase of lead in the alloy. Dr. Dudley's tests first compared the "Standard Phosphor Bronze" with the copper and tin alloy without lead; but as the alloy containing lead was found to be so superior to the alloy without it, further tests were made increasing the lead and decreasing the tin, until the alloy in Dr. Dudley's experiment "B" was reached, which consists of copper 77%, tin 8% and lead 15%. Dr. Dudley attempted to make alloys with higher lead and lower tin content, but failed to produce satisfactory bearings of such alloys because of segregation. In the light of our present knowledge on the subject, it is hard to understand why Dr. Dudley failed in his attempt, the only explanation which would apparently account for his failure, being the presence of some detrimental impurities, in all probability phosphorus, as Dr. Dudley's tests were presumably all made with alloys containing some phosphorus. Phosphorus has the property of maintaining the alloy in a liquid condition for a long period of time, and this is just the condition which is to be avoided in order to produce homogeneous copper-tin-lead alloys high in lead. Dr. Dudley adopted as a result of his experiments, as a standard for the Penna. R.

R., the above mentioned alloy, which has since been known as "Ex. B. Metal."

Appreciating the advantages to be derived, were it possible to produce bearings with lower tin and higher lead content than Dr. Dudley's "Ex. B. Metal," we carried on a series of experiments and microscopic examinations of copper-tin-lead and copper-tin alloys which resulted in the invention of two processes of producing such alloys; our first patent covering the use of nickel for the purpose, the object of the nickel being to produce a quick solidifying matrix which would hold the lead in even distribution throughout its mass. Our microscopic examination proved conclusively that lead is but mechanically held in such an alloy in a copper and tin matrix, and as lead has a very much lower solidifying point than the copper and tin matrix, the problem, as it appeared to us, was one of producing a matrix of quick solidifying properties, the first idea presented, being to add a metal which would combine with this matrix and produce the desired result. After making experiments with practically all the high melting point metals, it was found that nickel gave by far the best results. In carrying out investigations further, we found it was possible to produce a quick solidifying matrix without the use of any foreign constituent, and without the employment of other than ordinary foundry methods. This consisted in limiting the amount of tin in proportion to the copper, so that only what is technically termed a solid solution of copper and tin was formed. This could be accomplished if the proportion of tin was maintained below 9% to 91% of copper. Our second patent, therefore, covered such an alloy in which the lead was at the same time above 20%.

A suit was brought against the Brady Brass Co., for infringing this patent, in the Circuit Court of the United States of the District of New Jersey. After three years, during which time a great deal of testimony was taken, a decision was handed down by Judge Archbald who was especially assigned to hear the case, on July 31, '07. The following are quotations from his opinion:

"The practical difficulty experienced with a copper-tin-lead mixture is that, in process of melting, a so-called eutectic or readily fusing alloy, between the copper and tin, is formed, as a subsidiary compound, which solidifies at a comparatively low temperature, allowing the lead, with a still lower melting point, to segregate and fall to the bottom, when present in quantity, producing what is known as lead sweat. To obviate this, a high solidifying point for the mass is requisite, at which the copper tin matrix shall set quickly and hold the lead properly distributed through it, before it has time to run off or settle, and with this secured an indefinite increase of lead is possible. The received idea, however, at the date of the patent, as the result of Dr. Dudley's experiments, was that the limit in the diminution of tin and increase of lead has been reached in the relative amounts there determined, the proportion of tin so fixed being supposedly required to hold up the lead, and tin and lead having to be increased together beyond that. But it was discovered by the present inventors that this was not the case, and that on the contrary the subject was regulated by a critical relation between the metals involved, by which tin at less than seven per cent, by weight, lead at more than twenty per cent, and the balance, or some seventy-three per cent of copper, there was a quick solidification of the mass without forming of any appreciable eutectic alloy, the large percentage of lead present being held and retained without difficulty, a small percentage of other metals, such as antimony, zinc, iron, etc., to be found in ordinary brass scrap as impurities, being also permitted. The proportions so given, it is to be observed, conform to a critical point in the constitution of copper-tin alloys, on one side of which, according to the relative percentages employed, they solidify or set quickly, at a high ttmperature; and on the other, by reason of different percentages, they combine differently, forming among other subsidiary compounds certain eutectic mixtures, which remain liquid for a much longer period, cooling slowly. The critical point is a well demonstrated scientific fact, which is generally if not universally, accepted; and is shown to exist close to where there are nine parts of tin to ninety-one of copper, or relatively something over nine per cent of the former. Having regard to this, and the consequences which flow from it when lead is additionally introduced, all the tin-copper-lead alloys divide sharply into those which contain this relative proportion of tin and copper, which by reason of their high melting point and the absence of eutectic alloys permit of a large content of lead; and those which fall outside of these limits, where this is not possible. The *adaptation of this principle* in the production of anti-friction alloys for railroad bearings constitutes the merit of the present invention and the contribution made by it to the journal bearing art. Its utility has been most signally recognized, the Pennsylvania Railroad having adopted and made large and increasing use of the alloy for a number of years, at first with the addition of a little nickel, which was supposed to produce a more homogeneous mixture, but latterly without it. And, upon certain bearings sent out from the Pittsburg shops for use on the lines west of there, having been found to infringe, the Company on notice desisted. It is also in use on the extensive system of the Norfolk & Western Railroad. And upon being submitted to counsel for the Eastern Railway Association, the companies composing that Association were advised to respect the patent, the practical significance of which will be appreciated. The proportions specified in the single claim of the patent are "less than seven per cent of tin, and more than twenty per cent., of lead, and the balance of copper." But these amounts are to a certain extent suggestive only and are not strictly adhered to in practice, the most satisfactory results for high grade bearings being secured with an alloy of five per cent., of tin, thirty per cent of lead and sixty-five per cent., of copper, a variation which the patent permits and was intended to cover. This with a small fraction of sulphur, which is of no materiality, is the combination made use of by the defendants, who thus admittedly infringe, if the patent is valid."

"This does not present simply the case of a copper-tin-lead alloy, low in tin and high in lead, nor yet of a specially composed journal bearing material. But it consists in the establishment of a *precise rule* or *formula*, by which within certain limits, to the extent desired, and without other than ordinary foundry methods, a homogeneous mixture of this general character, known to be of the highest utility for the purpose, is capable of being successfully produced. Standing for this, as the patent clearly does, there is nothing in what is so sought to be urged against it, which detracts from the merit or the validity of the invention."

An appeal was taken to the United States Circuit Court of Appeals which reversed the decision of Judge Archbold, finding that the claim of the patent covered only a product and not a process, and that the alloy as covered by the claim differed from Dr. Dudley's "Ex. B" metal and other copper-tin-lead alloys only by degree, and was therefore not patentable and declared the patent invalid. The following quotation being from their opinion:

"A mere difference in the proportions of the constituents of an alloy, however, useful the result may be, does not entitle the originator to a monopoly of the patent in the absence of other circumstances than those here disclosed."

The Supreme Court of the United States upon appeal, denied a *certiorari* and application was thereupon made to the Patent Office for a re-issue of the patent. The patent laws of the United States provide for a re-issue of a patent provided errors are included in the original specification which make the patent inoperative, and that such errors arise from inadvertence, accident or mistakes without fraudulent or deceptive intention. This application to the Patent Office was made because the original patent as drawn was believed to cover the real invention as defined by Judge Archbold as above recited, i. e. "that the patent does not simply present the case of a copper-tin-lead alloy low in tin and high in lead, nor yet of a specially composed journal bearing material, but it consists in the establishment of a precise rule or formula by which, within certain limits to the extent desired, and without other than ordinary foundry methods, a homogeneous mixture of this character known to be of the highest utility for the purpose is capable, of being successfully produced."

The Court of Appeals however, speaking by Judge Gray, reversed Judge Archbold's decision, taking an entirely different view of the patent, and stating that the invention was for a mere product low in tin and high in lead, and differing from other products merely in degree. The inadvertence therefore consisted in the preparation of a patent which Courts constructed on the one hand to be for the establishment of a precise rule or formula, and on the other hand, to be for an alloy low in tin and high in lead, and differing only in degree from what had gone before.

In consequence, it was only after this case had been "threshed" out for practically four years, that such errors in the specification became apparent. The patent office took this view of the matter and have re-issued the patent, specification which is as follows:

1. The improvement in the production of copper-tin-lead alloy for bearings, which consists in limiting the proportion of tin to less than substantially nine per cent., of the copper in the mix and increasing the lead above twenty per cent., of the mix, whereby upon melting and casting a copper-tin alloy substantially free from low solidifying combinations of copper and in results, which alloy when cast sets quickly at a high temperature forming a matrix which holds up all the lead, substantially as described.

2. In the production of copper-tin-lead alloys for bearings the described improvement which consists in holding up all of a high percentage content of lead substantially [illegible] more than twenty per cent. of the [illegible] by limiting the tin [illegible]

to below nine per cent of the copper, in accordance with the existing critical point in the formation of copper tin alloys, thereby providing a matrix of copper and tin substantially free from slow solidifying combinations of copper and tin and which on cooling solidifies quickly at a high temperature, thus holding up the lead in any desired amount within the requirements of a bearing and preventing its separation from the copper tin matrix during cooling, substantially as described.

This case becomes more interesting, as it is the only one in the United States which has ever been tried in connection with alloys, and that under the ruling of the Court of Appeals all patents on alloys which have been granted by the United States Patent Office could be held to be invalid had any of the metals in such alloys been previously combined in any proportions whatever. In other words, it would practically shut out all patents on alloys no matter how useful they may be, or how different in their properties they might be, due to change in proportions.

There are many instances of peculiar and valuable alloys due simply to change in proportions. In some cases a slight change in proportions produces properties which would be entirely unexpected. The Patent Office have by the re-issue of this patent sustained the opinion of Judge Archbold, i. e. that the patent covered not only a product, but a process, and the effect of the re-issue is the same as an entirely new patent, which is affected in no way by the decision of the United States Circuit Court of Appeals.

Spelter is now graded according to the lead it contains and its price is usually proportional to the lead content. That which contains the least lead commands the highest price.

Soft metals, such as britannia or pewter, should not be cleaned for electroplating in the same potash kettle used for cleaning brass or copper goods. Tin and lead are dissolved by caustic alkalies and when brass or copper is immersed in the solution, a film of these metals is deposited upon the surface. Separate kettles must be used for both kinds of work. Much work is spoiled in this manner, and deposits will not adhere to brass or copper when the film of tin or lead has coated the work. Even when very slight it is dangerous.

Chilled Steel Shot for Use in the Sand-Blast and in Tumbling Metal Goods.

Chilled steel shot are now coming into use for cleaning castings by means of the sand blast, and for other purposes in which the sand blast is used. They are used in place of sand as they do not crush or pulverize like sand and their life, therefore, is longer. The shot are made by melting a suitable kind of steel and then forming into shot in the same manner that lead shot is produced. To chill them, they are allowed to fall into water after having been formed and set. In this manner a spherical shot of great hardness is made.

In regard to the value of steel shot for sand-blasting, a leading sand-blast manufacturer makes the following comments:

"Steel shot are rapidly taking the place of sand for sand-blasting purposes as they do not crush or pulverize like sand. Every grain of sand is a stone hammer and every grain of steel shot is a steel hammer and is, of course, more effective. The shot works much faster and does a greater amount of work in a given time and 1 ton of shot will do as much work as 80 or 100 tons of sand."

In regard to the use of the steel shot for tumbling purposes it may be said that extensive experiments have demonstrated that they cannot in any way be used to take the place of the more expensive steel balls for this work as they are not sufficiently smooth, nor can they be made so by tumbling with emery. There is always a rough spot on the shot which interferes with this work.

For cutting down steel work or for tumbling cast iron, the steel shot are useful, but they are unsuited for polishing work by tumbling and the highly polished steel balls must be used for such a purpose.

The steel shot may be obtained at varying sizes from that almost powder to a quality about the size of coarse sand.

"Sherardizing" is a variety of galvanizing. It is done by tumbling the iron or steel to be galvanized in zinc heated to a point slightly below the melting point of zinc. In order to prevent the oxidation of the zinc when heated, illuminating gas is allowed to fill the receptacle in which the tumbling is done.

A New and Novel Form of Apparatus for Casting Ingot Metal.

In making ingot metals by pouring molten metal into ingot metals ,the regular practice is to place the molds on the foundry floor and then, after they have been filled with the metal and it has "set," to take each mold separately with a pair of tongs, turn it over and dump out the ingots. Not only is this operation time consuming, but it injures the molds and the floor. It is also hard and hot work. It has always been done in this manner and probably ninety-nine out of every hundred brass foundries do it in this way The remainder have some method equally as bad.

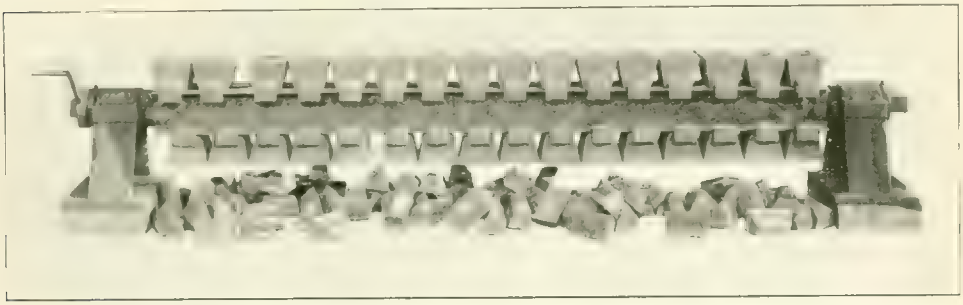


Fig. 1. Apparatus for Casting Brass Ingots and Ready for Pouring.

A new and novel form of apparatus has recently been constructed by the Bridgeport Foundry & Machine Co., of Bridgeport, Conn., for holding ingot molds while the metal is being cast, and then dumping them all together. This apparatus is herewith illustrated. It consists of a frame-work of steel I beams to which the cast iron ingot molds are fastened, but so that they may be readily removed when broken The molds are placed in two rows; one on each side of the beams.

At each end trunnions are fastened to the beams which rest upon pedestals bolted to the floor At one end, which may be noticed by referring to the illustrations, a handle is fastened to one of the trunnions so that the whole device may be turned over. A stop serves to fasten the handle in the desired position when the molds are being filled so that the whole apparatus is rigid.

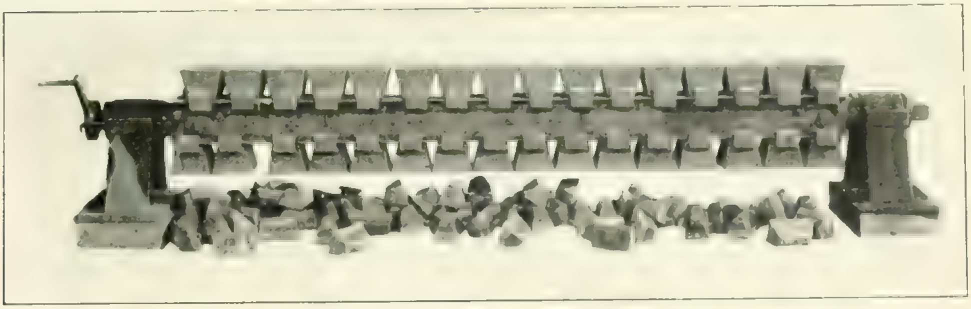


Fig. 2. Ingot Casting Apparatus after the Ingots have been Poured.

To use the apparatus for casting ingot metal it is placed in the position shown in Fig 1, with one set of molds looking up. The handle is then fastened and the metal poured into the molds After it has been cast, it has the appearance illustrated in Fig. 2.

When the metal has "set" and the ingot molds are ready for dumping, the handle is grasped and the whole apparatus turned over until it comes to a sudden stop when the shock instantly causes the ingots to fall out on to the floor or in a wheelbarrow as may be desired. In Fig. 3 the dumped ingots are shown and the position of the apparatus in dumping them.

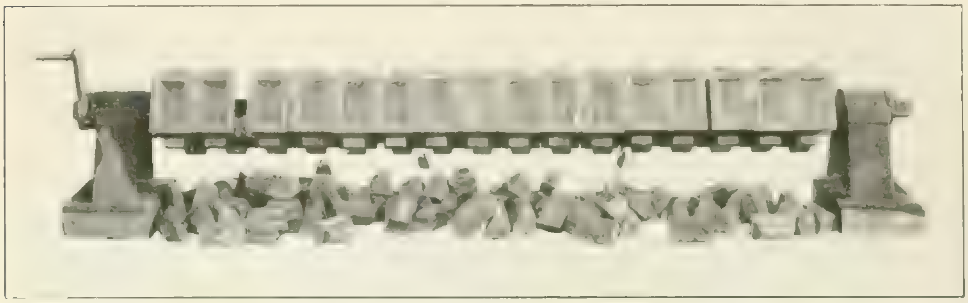


Fig. 3. Ingot Casting Apparatus Immediately After the Ingots have been Dumped.

The apparatus is capable of handling a large quantity of ingots per day with very little labor, and even this is not hard. When one set of molds has been dumped, the other is ready for casting and the first set is cooling underneath. It may be made of any desired size so as to take a large or small number of ingot molds

Treating Cement Tanks to Make them Acid Proof

Cement tanks are frequently used for holding solutions, either for pickling or electroplating. They are more extensively used in the electrolytic refining of metals than in other lines. Anson G. Betts in a recent patent 918,040, Apr. 20, 1909 claims the use of sulphur for impregnating a cement tank and rendering it impervious to solutions. The tank is made of Portland cement and after drying is either submerged in a pot of melted sulphur or the sulphur is melted in it. Steam is evolved for some time and when this has ceased, the whole is slowly cooled and the sulphur is absorbed. The pores of the cement are, therefore, filled. As sulphur is slightly acted upon by some solutions, the interior of the tank is then given a coating of another material such as paraffine or asphalt to protect the sulphur. The object of the sulphur is to render the cement waterproof

Retarding the Setting of Plaster of Paris.

That glue or gelatine will retard the setting of plaster of Paris is well known. Such materials have been in use for years for this purpose. Jerome Alexander in the *Journal of the Society of Chemical Industry*, March 31, 1909, page 282, has made some experiments upon the relative effects in retarding of varying quantities of gelatine. He obtained the following results. The plaster was mixed with water containing the different amounts of gelatine. One part of plaster was mixed with one part of water containing the amount of gelatine given:

Gelatine used	*Time of Setting*
0	40 minutes
0.01%	50 minutes
0.10%	290 minutes
0.25%	510 minutes
0.50%	900 minutes
1.00%	Not set in 48 hrs
2.00%	Not set in 48 hrs

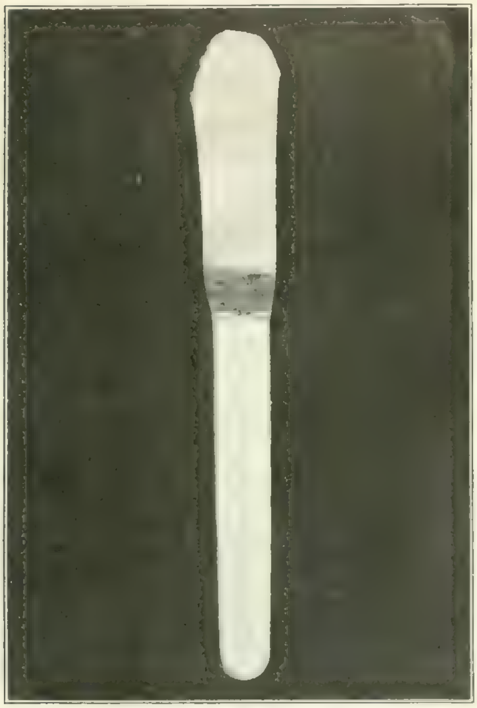
These tests are of interest as they indicate how small a quantity of gelatine will retard the setting of plaster of Paris

Although the actual discovery of aluminum belongs to Ferdinand Wohler, Professor of Chemistry in the University of Gottingen, Germany, who in the year 1827 succeeded in isolating it, it was not until 1854 that the real properties of the metal became known when H. St. Claire Deville of Paris produced the metal *en masse*. Wohler had produced only powder and small, impure globules

The Value of Cadmium in Soft Solders.

By Erwin S. Sperry.

The object of using soft solder in soldering metals is on account of its low melting point. Did it not have this property, it could not be employed. Ordinary soft solder consists of tin and lead, and the best quality contains about 2 parts of tin and 1 part of lead. The reason that it is the best is because it has the lowest melting point of any of the tin and lead mixtures. In other words, this alloy is the *eutectic*. Whenever the best soft solder is desired, it has always been customary to use this mixture.



Soft Solder Containing Cadmium Showing that it Can be Rolled into Sheet.

While ordinary solder answers well for many kinds of work, in others its melting point is not sufficiently low. As previously stated the mixture of about 2 parts of tin and 1 part of lead has the lowest melting point of any of the tin and lead mixtures, so that it is impossible with tin and lead alone to obtain a more fusible solder than this one.

It is not generally known that the addition of cadmium to soft solder containing tin and lead greatly improves it by *lowering* its melting point and *increasing* its strength. Now that cadmium can be obtained at a reasonable price, its use in making a soft solder with a low melting point should become extensive.

The best mixture for the soft solder containing cadmium has been found to be the following:

Tin	.50% or 2 parts
Lead	..25% or 1 part
Cadmium ...	25% or 1 part

The metals are melted together and a small quantity of sal ammoniac is used on the surface for a flux. This cleans it well. Before pouring into bars, the solder should be well stirred in order to thoroughly mix the metals.

When cast, the bars of this solder have a slight roughness on the surface caused by crystallization, but I have not found that it detracts from the value. It is only superficial.

The cadmium increases the strength of the solder as can be easily ascertained by bending a bar. The stiffness will usually surprise those who are accustomed to use ordinary soft solder.

The melting point of this cadmium solder was carefully tested by means of an accurate thermometer and found to be 291 degrees Fahrenheit (144.5 degrees Centigrade). This is about 30 degrees lower than the best solder composed of 2 parts of tin and 1 part of lead.

As cadmium is now not very expensive, the cost of the solder is not increased very much. It will be found useful for soldering soft metals such as britannia, pewter, tin, [illegible] lead and similar low melting [illegible] and will tend to render the soldering operation much safer, as there is less danger of melting the metal to be soldered.

A good coating of a "gun-cotton" lacquer on plating racks will [illegible] for some time in preventing the [illegible] of metal on them. The lacquer [illegible] potash and soda when [illegible] time. Some platers use the lacquer for protecting their racks. [illegible] stand under [illegible] conditions.

The Tarnishing Effect of Illuminating Gas on Various Metals.

An extensive series of experiments were recently undertaken by Arthur D. Little of Boston, Mass., the well known chemical engineer, for the purpose of determining the tarnishing effect of illuminating gas upon metals when burned in a room. The experiments were conducted with two grades of gas: Ordinary illuminating gas, and oxide gas which had been purified. The object of the tests was to show what effect any sulphur in the gas might have on the metals. Mr. Little's report is as follows:

"The metals consisted of block tin, sheet tin, sheet lead, sheet zinc, sheet brass commonly used in making lighting fixtures and heavily silver-plated spoons."

"Four sets of carefully cleaned and polished samples were prepared. One set was put in a tightly closed jar and reserved for later comparison. Another set, sheltered from the weather, was exposed to the outside air. Another set was hung in the experimental room during the time that oxide gas was being burned; and the remaining set was exposed to the air of the room during the time that street gas was being burned. The total length of exposure in each of the cases was 144 hours. Lack of time did not permit extending of the experiments over a longer period. When the samples were not being exposed to the air they were kept in closely sealed jars in order to protect them from any corrosive action. By comparing the samples at the end of the experiment the following observations were made:

Silver Spoons: All of the spoons, except the blank kept for comparison, were tarnished to a yellow brown. It was judged that the spoon exposed to the oxide gas was very slightly more tarnished than either of the other exposed samples. There was no appreciable tarnish on the blank.

Block-tin: There was no appreciable change in any case.

Copper: The piece exposed to the outside air was tarnished the worst with a reddish brown tarnish. The samples exposed to the oxide and street gas were about equal and were but slightly tarnished as compared with the blank.

Lead: The sample exposed to street was tarnished more than the oxide gas sample which in turn was tarnished a little more than the sample exposed to the outside air. Even the blank had tarnished to a considerable extent as could be determined by exposing a fresh surface by scraping.

Tin Plated Iron: No appreciable change took place in any case.

Zinc: The sample exposed to the outside air was tarnished much the worst. The sample exposed to the street gas was slightly tarnished, and that exposed to the oxide gas still less; the tarnish in all cases was white. There was no appreciable tarnish on the blank.

Brass: The samples of brass were all about equal and showed no particular tarnish.

"The difference between the metals was not particularly marked in any case. It will be noticed that in general there were no greater indications of tarnishing when oxide gas was burned than under other conditions. It would, therefore, seem that the air of a room, in which oxide, rather than street gas had been burned, had not caused any appreciable increase in the tarnishing of metals."

The Relative Value of Organic Substances in Producing Smooth Electro-Deposits.

It is now a well established fact that certain organic substances, when present in electroplating solutions, serve to produce dense and smooth deposits. They are now more or less extensively used for this purpose, and in producing heavy deposits in a rapid manner they are particularly efficacious. Two Germans, Muller and Bahntje, in the *Zeitschrift f. Electrochemie* determined the relative value of some of the organic substances used for this purpose.

They found that gelatine (or glue) had the most powerful effect, egg albumen was considerably less, and the gums and starch had very little action. When copper was deposited from a solution containing gelatine, the deposit weighed about 0.2 per cent more than when obtained from a solution not containing it. This shows that some of the gelatine is deposited with the copper. The explanation which they give of the smooth and dense deposit is that the gelatine keeps the metal in an amorphous or non-crystalline condition.

What is Being Done in Metallizing Flowers.

There is no portion of electroplating that is receiving more attention at the present time than the art of metallizing flowers. In every town and hamlet, metallized roses in the form of hat pins are displayed and bear witness to the success that is now obtained in this line and how a master hand can evolve an attractive and marketable article from a product of nature, and by a process which so many have tried to solve in the past with nothing but failure as the result.

Fig. 1. Louis G. Delamothe.

To Louis G. Delamothe belongs the credit of being the first to make the metallizing of flowers a commercial possibility and success. To be sure, the process of metallizing flowers and non-metallic objects is old. It has been done for many years, but it was not until Delamothe had improved the process that it became a commercial one. Before this time, it could scarcely be called anything more than a laboratory possibility.

Mr. Delamothe is a Frenchman and came to this country about twenty years ago. From boyhood he has made a study of electro-metallurgy and particularly the metallization of flowers. Until the last few years he was identified with Eastern concerns, but seeing the possibilities of his process of metallization, he moved to Spokane, Washington so as to be able to obtain roses used as his raw material to the best possible advantage. The Pacific Coast has proved satisfactory to him in this respect and in his factory, from eight to ten thousand roses are continually kept in cold storage for immediate use

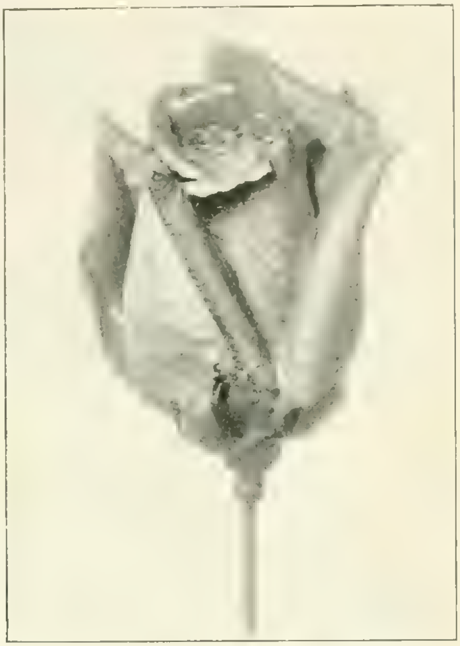


Fig. 2 Metallized Rose Made for a Hat-Pin.

The process which Mr. Delamothe employs for metallizing flowers is claimed by him to be entirely original and unknown as yet to science. He has never patented it for the reason that he believes it would result in disclosing the method and thus instruct the public in its use. He has succeeded in preserving his art of metallizing to such an extent that even his own workman are unable to discover what it is. The secret consists

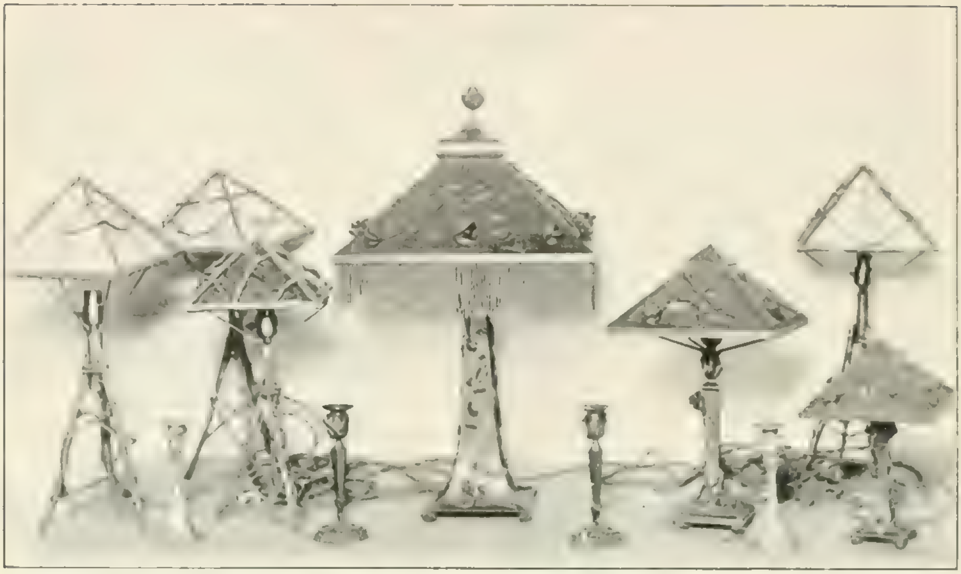


Fig. 3. Portables and Other Varieties of Art Metal Work made by the Delamothe Company.

of a certain liquid which, Mr. Delamothe says, can be maintained without disclosure as he is able to make a sufficient quantity in a day to last a year. His process, he claims, differs from the methods heretofore known for metallizing flowers in that the metal takes the place of the organic material and does not merely deposit over it as in other processes. In this manner the delicate detail of the flower is preserved and not ruined by covering up with a metallic deposit.

As evidence of what can be done in this direction, Mr. Delamothe can take a dragon-fly with its web-like wings and metallize it so that every vein shows, and it is transformed into a beautiful brooch. He takes a cluster of California grapes and changes them without loss of shape or detail into any desired

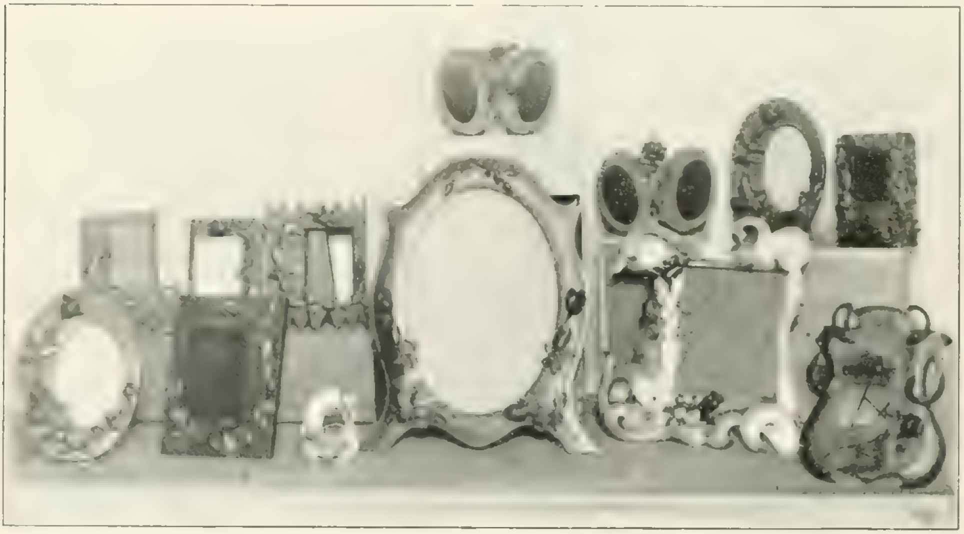


Fig. 4. Metallized Frames with Flower Ornaments Made by the Delamothe Company.

metal. In the illustrations herewith shown, a few of the numerous varieties of work done by Mr. Delamothe may be seen, and the great possibilities of the metallizing process demonstrated. Although he preserves his process as a secret, the world owes him a debt of gratitude for indicating the possibilities of the metallization of non-metallic substances; and he deserves full credit for his work as a pioneer in this line.

The Modern Method of Silvering Glass Mirrors.

The earliest mirrors known to history were those supplied by Nature, and the still pool of water reflected the image of those who stood near it. Narcissus, the mythological youth who became so enamored of his image that he was changed into the flower bearing his name, had only Nature's mirror in which to discover his beauty.

The discovery of metals furnished a mirror of vastly superior qualities to the water pool, and until the discovery of glass and the method of silvering it, was the only one used. Although satisfactory if highly polished and free from tarnish, metals do not possess the hardness necessary to maintain them free from scratches or the non-corrosive properties to keep them bright. They are, therefore, far inferior to the so-called glass mirrors, although these owe their reflecting power to the silver on them while the glass serves simply as a protection to prevent abrasion or corrosion.

The former method of making a glass mirror was to make an amalgam of mercury and tin foil by covering the tin foil laid on a flat, non-metallic surface with the mercury, then applying the glass plate and applying pressure to force out the mercury. The amalgam of mercury and tin adhered to the glass making the reflecting surface.

The mercury process, however, has almost fallen into disuse and as far as can be learned, there are only a few concerns making cheap mirrors from window glass that use it. The greater part and, in fact, it may really be said practically all of the mirror manufacturers, use the silvering process for coating. The color thus produced is whiter, the metal adheres better, and there is no danger to the health of the operator as there is in using mercury. It is usually said in the trade that those who do adhere to the use of mercury do it because of their lack of knowledge in carrying out the silvering process.

Silver is easily precipitated in the metallic form from its solutions and deposits upon anything with which it may be in contact. If glass is present in the solution, the silver deposits upon it. This is the principle of mirror silvering. While many solutions deposit silver there are only a few which give the necessary results in silvering glass, and there is practically only one which is in universal use. There are several qualifications for a silvering solution which have to be met in mirror silvering. The solution must not deposit its silver instantly but allow plenty of time to get on to the glass. It must also produce a satisfactory silver deposit.

The solution in general use and which answers the preceding conditions is the following:

Solution A.

Water .... 5 oz.
Silver nitrate .... 1 oz.

Dissolve the silver nitrate in water and then add ammonia to it, drop by drop, until the precipitate formed is just re-dissolved *and no more*. Then add to it:

Water to make .... 1 gallon.

Keep this solution in a glass stoppered bottle away from the light.

Solution B.

Water .... 10 oz.
Rochelle Salts .... ½ oz.

The Rochelle salts are dissolved in the water by warming and when this has been done add to it:

Silver nitrate .... [illegible]

Now boil the solution for about 10 minutes and it will turn dark colored. It is allowed to cool and then filtered, through absorbent cotton in a glass funnel to remove the black precipitate formed in it. When this has been done add:

Water to make . 1 gallon.

and keep in a glass stoppered bottle away from the light.

When the preceding [illegible] have been done, there will have been [illegible] 1 gallon of "Solution A" and 1 gallon of "Solution B." To use them for silvering take

Solution A . . . . 1 part (or gallon).
Solution B . . . . 1 part (or gallon).

While each solution will keep before it is mixed with the other, when they have been mixed together, silver will begin to deposit before long so that the mixing should not be done until needed.

The glass to be coated must be *chemically* clean or the silver will not adhere to it and stripping will result. It should be washed with clean water and then rubbed with a soft cloth and fine, moist whiting. After this it is again washed perfectly clean. It is then laid on a perfectly level surface or table. A marble or other stone slab may be employed, but the use of one made of good Portland cement is now extending as it is cheap and may be readily made. A wood table is not satisfactory as it warps and the glass does not lie flat.

A good thickness of Canton-flannel (called the "blanket") is laid upon the stone and the glass upon this. The object of the blanket is two-fold: First, it serves to give a good bed for the glass and prevent its becoming scratched. Second, it serves to absorb the solution that wastes or runs off the sides. Around the edges of the table a trough is built to retain the solution when it runs off. The "blanket" is used until it becomes stiff from the silver solution in it, when it is sold to silver refiners or sweep smelters.

The silvering solution having been mixed is allowed to stand until it is *almost* ready to precipitate out its silver. If mixed right away and then poured on the glass, the precipitation of the silver takes too long. For this reason it is previously mixed so when the silver is about to separate out, it can immediately be poured on to the glass and have the silvering take place at once. The determination of this precipitation or separating point requires skill and experience and depends upon the warmth (warm solutions deposit the silver more rapidly than cold ones) and the strength so that no rule can be laid down. With the solution previously given it takes from half to three-quarters of an hour for the silver to separate.

When the solutions A and B have been previously mixed and allowed to stand nearly to the separating point the mixture is poured on the plate so that the whole surface is covered and as little runs off the edges as possible. With skill and a level plate it is possible to cover a plate with the solution so that capillary attraction holds it from running off at the edges.

The solution is allowed to remain on the surface until the silver has deposited on the glass, when the excess is allowed to run off and the surface is then carefully washed with water and allowed to dry. The silver is then given a protecting coat of varnish. Asphalt varnish or shellac varnish is usually employed.

Investigators have discovered some interesting facts in regard to silvering glass by this method. It seems to be the opinion of those who have experimented along this line that the whiteness of the silver deposited when Rochelle salts are used is superior to that produced by any other method. Formaldehyde is an excellent reagent for reducing the silver in place of the Rochelle salts, but the deposit is not as white as that reduced by the Rochelle salts.

While the proportions of the ingredients used in making up the solution are not important as far as the actual deposition of the silver is concerned, if the best results are desired it has been found that the quantity of Rochelle salts in it should be about half that of the silver nitrate. These proportions give the best deposit. If one does not adhere to it, however, the deposit is apt to be off color and lack brightness. A French investigator, F. Fafet, arrived at this fact.

The preparation of the glass for receiving the silver deposit has much to do with the success. The investigator previously mentioned says that if the glass is washed over with a very weak solution of stannous chloride (bi-chloride of tin) previous to silvering, and then washed off with water, the silver deposit forms on the glass from three to five times as rapidly. It is stated that even when the solution contains as small a quantity as 0.001 per cent, the same results prevail. It is explained, he says, by the formation of a tin silicate when the solution comes in contact with the glass which assists in the reduction of the silver.

The silver thus deposited on the glass surface is said by those who have measured it to be about 0.0005 inches in thickness. It is also easily acted upon by various substances. Tartaric and citric acids act upon it, and many varnishes attack it. In fact, it is said that there is no varnish which in time does not act upon it. Asphalt varnish seems to attack it more rapidly than any other. The linseed oil varnishes act upon it less rapidly while shellac, mastic or sandarac gums seem to have the least action. The use of a shellac varnish to which a very small quantity of ammonia is added is recommended for the first coating on the silver, after which any desired varnish may be used as they do not come in contact with the silver.

In coating glass surfaces with the preceding solution other than large, flat mirrors, the deposition of the silver may be greatly hastened by warming the solution and exposing to the sunlight when in contact with the glass. The use of silver for coating glass for use as mirrors seems to have begun in the year 1844 with what is known as Drayton's process. In this the silver nitrate solution was reduced by essence of cassia and oil of cloves dissolved in alcohol instead of the Rochelle salts as now employed.

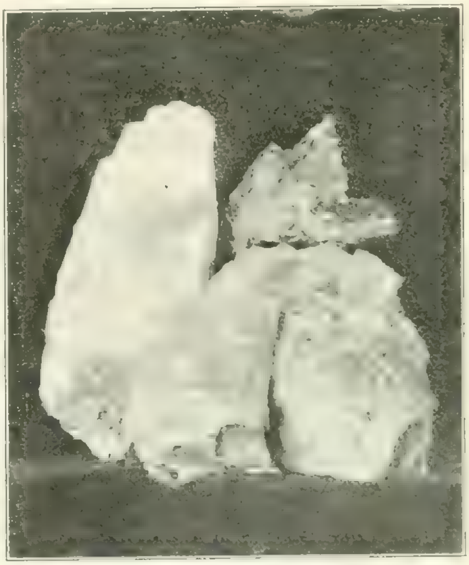
Metallic Chromium and its Properties.

Metallic chromium is now a commercial article and can readily be obtained of high purity and at a reasonable price. As far as known, it has not yet become a constituent of the non ferrous alloys, although it has long been used in making very hard and tough steels.

Although chromium has long been known, it was not until the advent of the electric furnace that it was produced in a solid mass. Previous to that time it was obtained only in powder or fine crystals. Solid, massive chromium is now obtained commercially in two ways. First, by the so-called "Aluminothermic Method." Second, by means of the electric furnace.

The "Aluminothermic" process consists in reducing the oxide of chromium by means of aluminum. The reaction which takes place supplies heat enough to melt the chromium. By adjusting the proportion of oxide of chromium and aluminum it is possible to obtain fused, metallic chromium of high purity by this process. It is free from carbon.

In the electric furnace process, oxide of chromium is heated with carbon by means of the electric arc and the chromium is then reduced to the metallic condition. When thus made it is combined with a large percentage of carbon, and requires purification. To remove the carbon, the crude chromium is melted with lime in an electric furnace. The carbon combines with the calcium to form calcium carbide, and the pure chromium is obtained as a fused mass.



Metallic Chromium as Now Found in Commerce.

By either of the processes it is possible to obtain fused, massive chromium of a purity of from 97 to 98 per cent metallic chromium. It does, therefore, compare favorably in purity with ordinary commercial metals.

As now found in commerce, of 97 to 98 per cent purity, metallic chromium has a [illegible] ly crystalline appearance, somewhat resembling in its structure that of antimony. It is brittle and is easily broken with a hammer. Its color is white and while not quite equal to silver, it approaches it and does not have the yellow shade of tin. According to Moissan, the celebrated chemist and authority on the rare metals, pure chromium has [illegible] gravity of 6.92 so that it is somewhat lighter than zinc.

The melting point of chromium does not appear to have been determined and the only statement about this property is that of Moissan who states that it melts at a temperature considerably higher than that of platinum although readily fused in the electric furnace. It will readily be seen, therefore, that it cannot be melted by any ordinary means. Moissan states that it is infusible in the oxy-hydrogen blowpipe flame.

Pure chromium does not tarnish perceptibly in the air and is considered one of the most non-corrosive metals. As it can be electrodeposited, its use for electroplating metals holds out much promise although very little work has been done along this line. Electrodeposited chromium in the form of small scales can be purchased from dealers in chemical supplies. Chromium is not magnetic if free from iron.

A summary of the properties of pure chromium is as follows:

It is hard and brittle.

The specific gravity is 6.92 or slightly less than that of zinc.

It is not magnetic.

The color is nearly silver white.

It cannot be melted by ordinary means and its melting point is higher than that of platinum.

The atmosphere does not tarnish it and it may be said to be permanent in the air.

Strong nitric acid and aqua-regia, either cold or warm, are without action upon it. Dilute nitric acid attacks it very slowly.

Hydrochloric acid attacks it very slowly in the cold, and more readily when heated.

Concentrated sulphuric acid, when heated, attacks it very slowly.

Sulphur has no action upon it, except when heated red hot.

The hardness of chromium is less than that of glass as it does not scratch it unless it contains considerable carbon.

As the ores of chromium are found extensively in nature it is probable that the future will find metallic chromium used for many purposes in metallurgy. The most promising field at present is in its electrodeposition to produce white and non-corrosive deposits on other metals.

A Lawsuit Over Metallized Roses.

The interest that is now displayed in metallizing flowers for use as hat pins is evidenced by two suits brought to restrain the Bastian Bros. Co., and Stephen D. Burritt of Buffalo, N. Y., from using the process known as the "Warner Patent." The suit has been brought by Grace Warner Peck, administratrix of the estate of Wm. A. Warner, deceased, the inventor of the process. The Benedict Mfg. Co., of East Syracuse, N. Y., are also interested in the suit as licensees as they have, it is said, exclusive right to manufacture metallized flowers for use as hat pins under the Warner patents. Mrs. Peck is a daughter of the inventor. It is said that the suit demands an accounting with the profits that have accrued since the goods have been manufactured.

Mr. Burritt states that he will defend the suit. He is a dealer and purchased the hat pins from a jobber. He purchased nineteen pins, displayed them in his window and sold all but two during the holiday season of 1908. The two were left in the window for display, and, according to his statement, a representative of the Benedict Mfg. Co., called on him, stating that he would like to purchase the pins as his company was desirous of removing this make from the market. The pins were sold and an order given to Benedict Mfg. Co., for a lot of their pins. These were received as well as a second consignment, but Mr. Burritt says, they were unsatisfactory and a part of the first and all of the second consignment were returned. After this had taken place, the suit was brought.

The Warner patent for the manufacture of hat pins out of rose buds or other flowers, consists of the use of an artificial calyx and in burning out the matter in the flower after it has been plated so that it will not spot out.

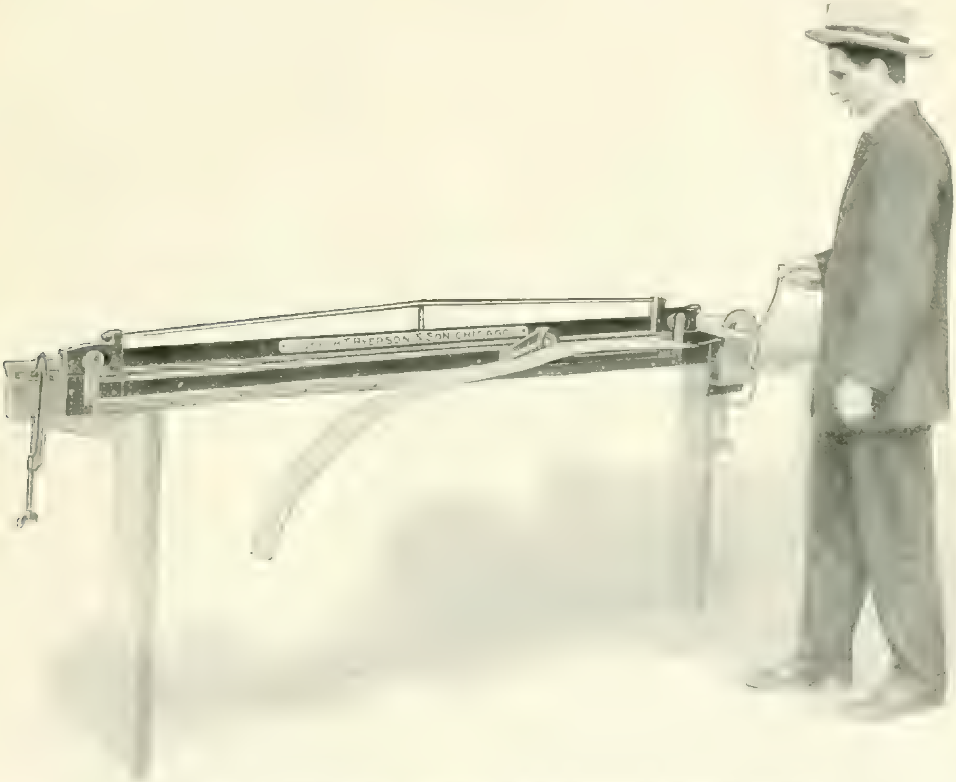
Hot cyanide copper solutions are coming into more extensive use than formerly, as platers now realize their value. Not only is the deposit brighter, but it deposits more rapidly and the deposit adheres more tenaciously than that produced from a cold solution. A weaker solution likewise may be used and those which are too weak to give any deposit at all when cold, will usually give a good one when heated.

An Inexpensive Rotary Squaring Shear.

There are few metal manufacturers who do not have occasion at more or less frequent intervals, to cut sheet metal of different kinds. The ordinary tinners' snips are quite unsatisfactory tools for such work as they leave the edge rough and the sheet is not trimmed in a workmanlike manner. In establishments employing power shears for squaring and trimming the problem is solved, but few shops doing a limited quantity of work can afford them

A useful and inexpensive squaring shear has just been placed on the market by Joseph T. Ryerson & Son, 16th & Rockwell Sts., Chicago, Ill. The shear is herewith illustrated. It is designed to shear a sheet up to 10 feet in length and of any width. The shearing is performed by small, circular tool steel blades which are mounted on a cutting carriage. This carriage is connected, by a strip of steel, to a drum turned by a hand lever. The sheet to be trimmed is clamped down to a bed by means of eccentric levers.

When the cutting is to be done, the hand lever is turned by the operator and the cutting blades are drawn along by the steel band thus effectually cutting the sheet. It will be noticed that the sheet may be trimmed or cut in any desired size. The blades rotate in opposite directions thus facilitating the cutting and reducing the power required.



Rotary Squaring Shear Showing Method of Cutting the Sheet Metal

The shear weighs about 200 lbs., and will cut sheet metal up to 20 gauge inclusive. For establishments which desire a squaring shear this machine will be found serviceable and inexpensive.

Brass for brazing should contain at least 75 per cent of copper in order to prevent its melting during the brazing.

A New Method of Rendering Wood and Similar Substances Acid and Alkali Proof.

According to a patent recently issued to Abraham Kronstein of Karlsruhe, Germany, wood, cardboard, wood fibre, cloth and similar materials may be made to withstand the action of acids and weak alkalies by impregnating them with Chinese wood oil and then heating to about 300 degrees F.

Chinese wood oil, also known as tung oil, is a material resembling linseed oil in its properties. It is obtained from a tree found in the Orient. It is frequently used in paints and varnishes in place of linseed oil and is said to be superior to it for some classes of work on account of its superior drying qualities. It has a peculiar odor of a penetrating nature.

The method used is to impregnate the wood or other material with the oil, and then heat to 300 degrees in an oven. The oil changes to a hard, tough substance which resists the action of acids and alkalies, the inventor says, to a remarkable degree. It is claimed superior to any other substance for this purpose. The wood may be impregnated under pressure.

The majority of the so-called potassium cyanide found in commerce is a combination of potassium and sodium cyanides and is made by the use of metallic sodium which accounts for the presence of sodium cyanide in the material. This combined material is extensively used in plating and in all kinds of work. As far as known, there is no indication that it does not give equally as good results as the strictly pure potassium cyanide as it is employed with success in the most difficult kinds of electrodeposition.

Casting Spiral Gears.

A new method of casting spiral gears has been patented by John S. Barnes of Detroit, Mich., and which is applicable to all metals. The method of carrying out the process is illustrated in the successive steps.

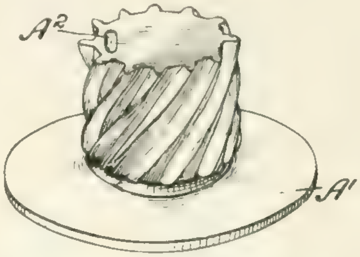


Fig. 1. The Pattern of the Spiral Gear.

In Fig. 1 is shown the pattern of the gear that is to be cast. In Fig. 2 the core box used for making the core is illustrated. In the pattern, the hole A2 is used to insert the runner rod A3 shown in Fig. 2. The pattern is inserted in the core-box (this core-box is made solid) as shown in Fig. 3 and the runner rod A3 inserted. The box is then rammed with sand in the usual manner so that it has the appearance shown in Fig. 3. The runner rod is then removed and the pattern taken out by unscrewing it by means of the rim A1. When this has been done a core shown in Fig. 4 is produced. This core is then dried.

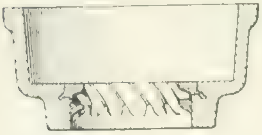


Fig. 2. The Core Box.

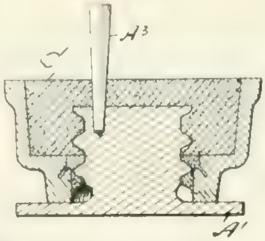


Fig. 3. The Core in the Box.

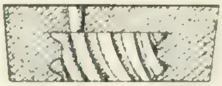


Fig. 4. The Core.

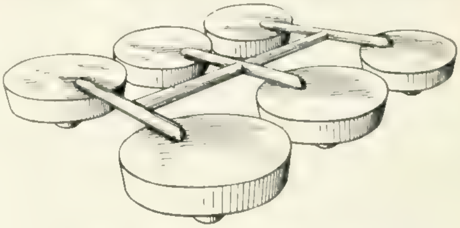


Fig. 5. The Gated Gear Pattern.

The gated pattern used in the molding flask is shown in Fig. 5 and the molding is done in the regular manner by means of a match plate. When this has been accomplished, the mold has the appearance shown in Fig. 6. The core previously made (C) is now inserted, and as the gear is usually desired with a hole through it, an ordinary round core G is previously placed in the sand before the gear core has been put in. When the mold is complete and is ready for casting it has the appearance shown in Fig. 7. The casting is done in the usual manner.

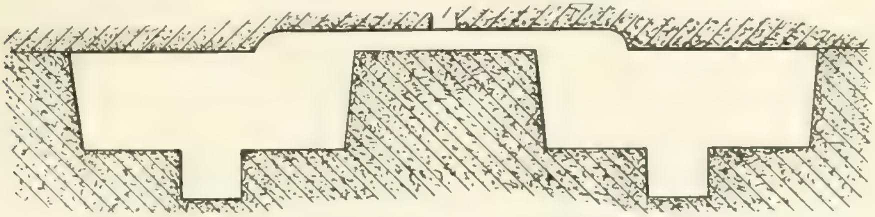


Fig. 6. The Mold Before Setting the Cores.

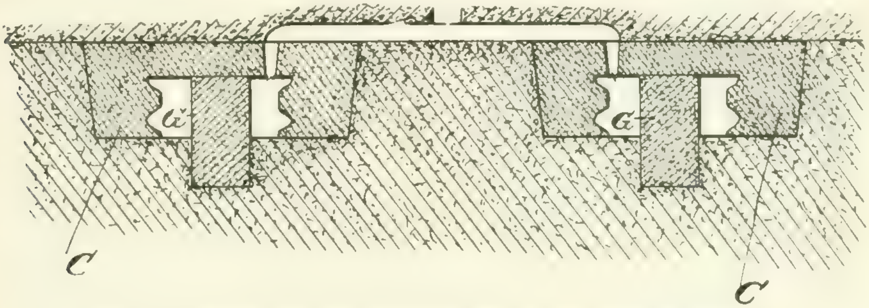


Fig. 7. The Mold after the Cores have Been Set and Ready for Pouring.

Making Aluminum Foil of Extreme Thinness.

As aluminum is not only cheaper than tin but lighter, and also less apt to injure foods with which it comes in contact, there has always been a desire to replace tin-foil, used for wrapping such materials as chocolates, candies and foods of various kinds, by aluminum-foil. In order to be of service, however, the aluminum-foil must be equal in thickness to tin-foil. Alfred Gautschi of Gontenschwil, Switzerland, has invented a process for rolling aluminum-foil (U. S. Patent 917,285, Apr. 6, 1909) which is more or less novel and he claims that the foil thus produced may be used in place of tin foil for wrapping purposes. He describes his method as follows.

"Flexible aluminum foil, serving the same purposes as the tin foil generally employed for packing chocolate and other eatables, could not hitherto be obtained, owing to the great difficulties presented in the rolling. It is true it has been found possible to roll aluminum in sheets of a thickness exceeding 1/10 of a millimeter, but not below this; the object in view was not thereby attained because the tin foil usually employed is far thinner than 1/10 of a millimeter.

"By my process of manufacture, I have succeeded in obtaining in good condition sheets of pure aluminum of great flexibility and having the same thickness as the thinnest of tin foil.

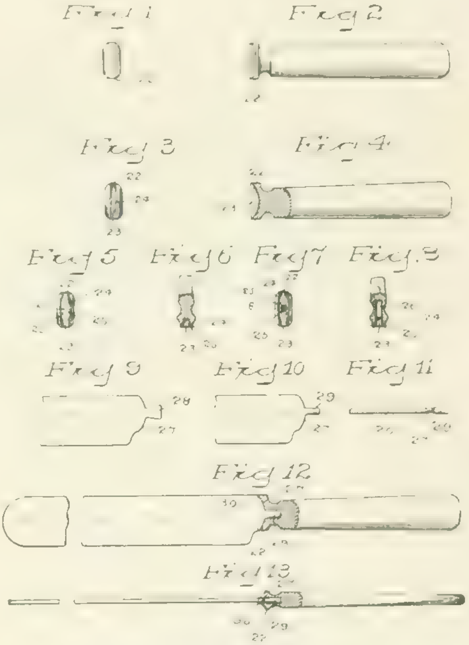
"The process is carried out in the following manner:—Starting with a sheet of pure aluminum of a certain area, approximately 1 mm in thickness and perfectly annealed, a first rolling of the thin sheet is effected by means of a rolling mill of any appropriate kind until the sheet reaches a thickness of about 3/10 of a millimeter. The sheet is then folded in two upon itself and rolled until its length is doubled by means of a rolling mill, the cylinders of which are set between their sheets and are heated by a circulation of hot water to a temperature of about 155° F., to facilitate the rolling of the metals. The sheet is then unfolded and it is again coated on one side with a solution of vegetable oil (soluble water) and water, the solution being of suitable viscosity, for example, two parts of oil to one part of water. The sheet is then again folded so that its coated faces are in contact and it is passed through the rolling mill with heated cylinders as described above until the length of the sheet has again been doubled. One side of this sheet is then coated with the oil solution indicated above and it is folded on itself and again rolled and so on in succession in accordance with what is termed the "packet" system of rolling, care being taken that the oil used may be glycerin, or any mineral or is always present between the sheets in contact with a thin layer of the oil solution. The vegetable oil may be used which is soluble in water. The solubility is obtained by means of a secret process which is not shown by me. The oil must be mixed with a great deal of water, because the sheets which it is sought to obtain being extremely thin, it is necessary that the oily substances between each sheet be very slight in quantity and yet thoroughly spread everywhere, conditions which cannot be had with pure oil. The mixture of oil and water has for its purpose to prevent the sheets from sticking together when they are rolled out. When the proper thickness has been attained, the rolling is suspended and the block of sheets is placed in a furnace where it is annealed. On leaving the furnace, after being slowly cooled, the block of aluminum sheets is cut with shears and the sheets are detached one from the other ready for use.

"It will be noticed that no annealing of the sheets of aluminum takes place from the time at which they are coated with the oily solution until the rolling operation is completed.

"The aluminum foil thus obtained is exceedingly flexible and presents the properties of being inoxidizable, unchangeable and exceedingly light, which is not the case with tin foil. In addition this aluminum foil does not impart to alimentary products the peculiar taste that is always imparted to them after a certain time, by the tin foil."

Steel Table Knives with German-Silver Handles.

Steel knives are the only ones which are satisfactory for table use, as it is impossible with other metals to obtain and maintain a good cutting edge. Knives have been made for a long time of solid German silver but it is impossible to obtain the desired edge on them. While various nickel alloys can be made which have a sufficient cutting edge when ground down, they are too hard to make into a knife and, therefore, cannot be used.



Manner of Making the Knives.

An improvement in such steel knives has recently been made by Thomas B. Lashar of the Holmes & Edwards Silver Co., of Bridgeport, Conn. (U. S. Patent 915,777, Mar. 23, 1909), and which would seem to greatly increase the value of a steel knife for table use. The invention consists of joining a steel blade to a German-silver or sterling-silver handle. Any other metal, of course, can be used, but these are the two generally employed.

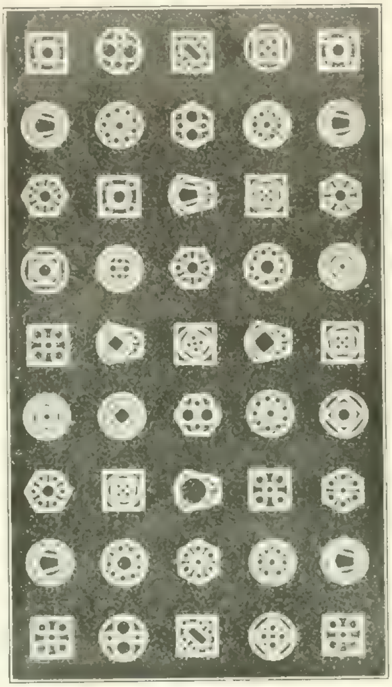
The steel blade is made in the usual manner but is supplied with a special tang as shown in the illustration. The white metal handle is made of rolled metal and swaged, pressed, or otherwise formed. It is supplied with a slot to receive the tang.

The blade is blanked out to the form shown in Fig. 9 and is provided with a convex curved base 27, corresponding with the concave groove in the bolster, and with a dove-tail tang 28. The next step, which is illustrated in Figs. 10 and 11, consists in swaging the dove-tail tang to a form which tapers outward in a plane at right angles to the plane of the blade, as clearly shown in Figs. 11 and 13, the completed tang being indicated by 29. It will be noted, (See Fig. 9) that the dove-tail of the tang as originally formed (see 28) tapers outward in the plane of the blade. After the swaging operation the taper of the tang is at right angles to the plane of the blade. This step is not an essential feature of the invention and may be omitted if preferred. The completed tang is then placed in hole 26 in the bolster and the knife is finished ready for the trimming and polishing or plating of the handle and bolster by swaging the metal of the bolster closely about the tang and swaging lips 24 closely about the sides of the base of the blade, it being understood that the convex curved edge of the base of the blade is seated firmly in the curved groove, the curvature of the base and groove corresponding. The tang of the blade is thus firmly locked in the bolster, the blade being firmly held against any movement by the seating of the base of the blade in the correspondingly curved groove, the engagement of the lips with the sides of the base of the blade, and the closing of the metal of the bolster tightly about the outwardly tapering tang so that separation of the blade and handle or loosening of the blade in the handle is rendered impossible. This operation may be performed by means of a drop or hydraulic press or in any suitable manner.

According to Moissan, the crystalline borides and silicides of titanium, obtained in the electric furnace, have a hardness equal to the diamond.

Some Odd Tubing Sections.

The National Tube Works of Pittsburg, Pa., are now manufacturing some very odd shapes of their "Shelby" seamless steel tubing. A variety of these shapes are herewith illustrated. The illustrations are of the cross-section of the tubing.



Odd Sections of Seamless Tubing.

The tubing is made by inserting the smaller tubes inside the larger ones and then drawing down enough to tightly bind the whole together. The result is a tube consisting of various smaller units which are held so tightly that they will not become loose. The tubing is cut off in sections for the various special purposes that may be found.

Calcium is now coming into use as a deoxidizing material in melting metals. It has a strong affinity for carbon, and, when introduced into [illegible] metal [illegible], forming calcium carbide which rises to the top of the metal as slag. [illegible] [illegible] [illegible] oxygen.

Bi-Sulphite of Soda.

Bi-sulphite of soda is made by passing the gas from burning sulphur into a solution of carbonate of soda (sal-soda) dissolved in water. The gas from burning sulphur is sulphurous acid gas which replaces the carbonic acid in the sal-soda and which escapes. A solution of sal-soda is alkaline and the sulphurous acid gas is acid. If the gas is allowed to pass into the solution until it is neither acid nor alkaline (i. e., does not redden blue litmus paper or color red litmus paper blue), the result is sulphite of soda or frequently called the normal sulphite of soda. When the sulphurous acid gas is allowed to pass in until no more is taken up, then the bi-sulphite of soda is produced. The term "bi" means that twice the amount of sulphurous acid is contained in it. Bi-sulphite of soda, therefore, has twice the amount of this acid in it that is contained in sulphite of soda, and when it is allowed to remain in the air the excess of acid passes off and sulphite of soda results.

A New Independent Spindle Buffing Lathe.

The independent spindle polishing and buffing lathe recently brought out by the Hanson & Van Winkle Co. of Newark, N. J., is an entirely new appliance in this line and is a marked advance in polishing and buffing machinery. It is the result of a demand that has been created for a device of this character and is designed for saving space, power and above all, time. The aggregate of these features, of course, means the lowering of the cost of polishing or buffing work.

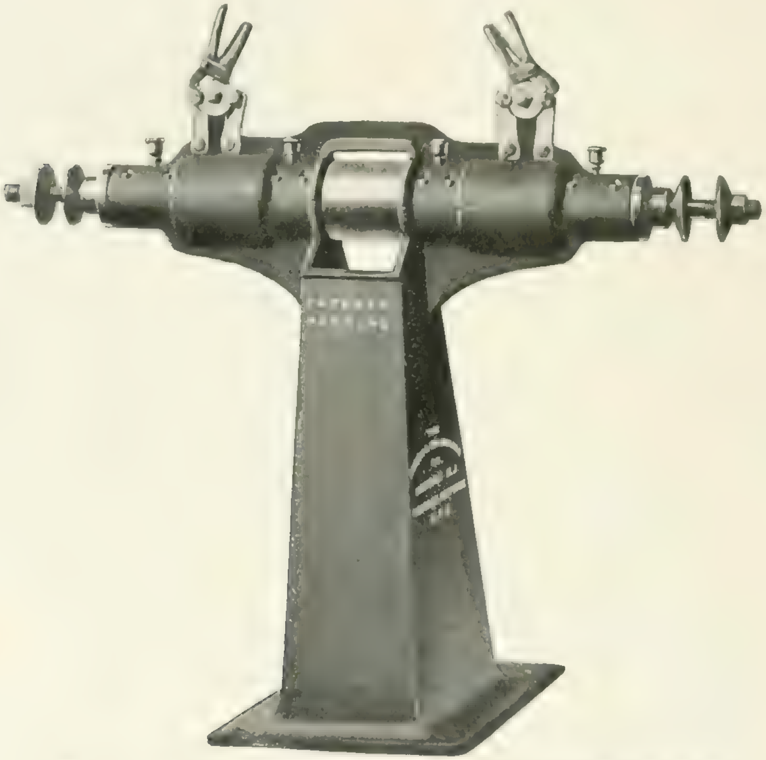


Fig. 1. The Hanson & Van Winkle Independent Spindle Buffing Lathe.

The spindle of the lathe is supplied with clutches at each end so that one stand really acts as two lathes. The machine may be operated by belt from either a shaft above or below the floor. The most satisfactory method, and one now being gradually adopted, is to have the line of shafting below the floor and run the belting up to the lathe. The pedestal protects the belt as it is operated inside of it.

The clutches at each end of the spindle are operated by hand levers within easy reach. No countershaft is required as both clutches may be thrown out if desired. The spindle then remains idle.

The object of the lathe is to allow polishing or buffing wheels to be changed without disturbing the belt, or the other end of the spindle. When two men are working at the lathe, one may change his wheel without any interference with his neighbor. He may also change the wheels with far greater dispatch than can be accomplished with the ordinary type of buffing lathe for the reason that there is no large and heavy pulley to continue to revolve after the belt has been slipped. The spindle quickly stops when the clutch is thrown out, and after the wheel has been changed, the simple throwing in of the clutch immediately starts the machine.

The time which this lathe is capable of saving will readily surprise those who adhere to the old type of machine. It has been demonstrated that it is possible to save as much as [illegible] hours per month [illegible] of work. In addition to this there is much less wear on the belt. When a countershaft is employed, as it is on the ordinary form of lathe, the constant shifting of the belt to the tight and loose pulleys not only wears it out, but serves to slacken it so that the spindle then fails to revolve at the necessary speed.

Yellow phosphorus is made by treating bone-ash with sulphuric acid to liberate the phosphoric acid (bone-ash is phosphate of calcium) and produce insoluble sulphate of calcium. The clear liquid phosphoric acid is evaporated to a syrupy [illegible] mixed with coke powder. This mass is heated in a clay retort, or in an electric furnace, in which the phosphorus is reduced to the elementary condition and distills over. The crude phosphorus thus obtained is melted under water, then filtered through chamois leather [illegible] commerce. The use of the electric furnace [illegible] economical.

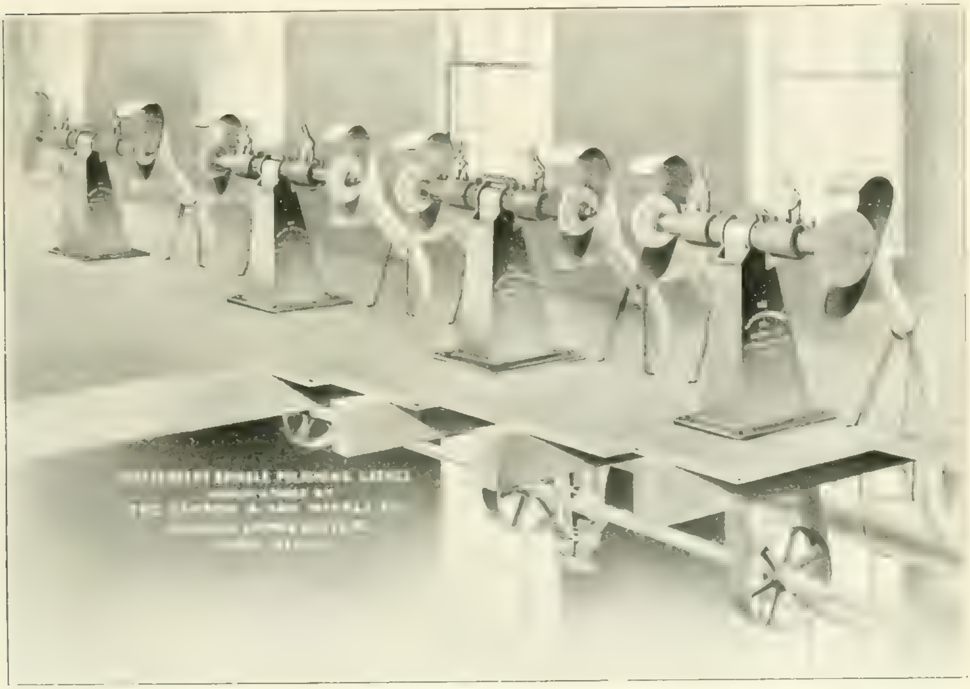


Fig. 2 Line of Buffing and Polishing Lathes Belted from Beneath the Floor.

Questions and Answers.

QUESTION NO. 628. We understand that chloride of zinc is an excellent flux in melting aluminum. Will you kindly inform us how it is used and the quantity to employ?

Answer. Chloride of zinc is excellent for this purpose. When the aluminum is melted and just before skimming, throw on a small piece of chloride of zinc. The surface will become clean, but to remove all of the dross several pieces are often required. The dross changes to a fine powder that is readily skimmed off. The quantity used is usually from 2 to 4 oz. to a No. 50 pot of aluminum, but more may be necessary when there is a large quantity of dross. You can easily ascertain when enough has been added by the appearance of the surface of the melted aluminum. When the amount of chloride of zinc has been sufficient, the surface is usually as clear and clean as molten tin or solder.

QUESTION NO. 629. What is the material that is put in the plugs of storage battery plates? I am using some of the batteries for plating and the plugs are beginning to come out.

Answer. In the majority of storage battery plates the plugs are made of peroxide of lead. We doubt whether you will be able to insert them as they are made of compressed material and inserted when the plate is cast so that the lead is formed around them.

QUESTION NO. 630. In making hot galvanized wire chain, we find that the color of the surface after galvanizing is dark on account of exposure to the air during the whipping process necessary to keep the links from adhering to one another. The color of the galvanized surface is much darker than that of an electrogalvanized surface and we wish to obtain one equally as bright. Is there any way in which it can be done?

Answer. You will not be able to obtain the white color on a hot galvanized surface that is produced in electrogalvanizing. The addition of a very small quantity of aluminum to the zinc when melted, if you are not already using it, will serve to increase the whiteness, and the use of good spelter will also improve conditions. We can suggest no other method.

QUESTION NO. 633. It there any mixture that can be used for casting valves and similar work to stand pressure, particularly that for hydraulic work, that is absolutely "leak-proof"? If so will you let me know what it is and how to pour it? The castings I have to make weigh from 1 lb. to 1,500 or 1,600 lbs.

Answer. There is no metal or alloy that is what you call "leak-proof." It is possible, by proper casting, to use any metal for pressure work, but the cost of casting is so much greater in one instance than another that it does not pay to use anything but those which may be readily cast. The fact that it is possible, by making a number of castings of any metal, such as aluminum bronze, which is very apt to leak under pressure, and yet have some of them good, fully demonstrates that the difficulty is in the casting of the metal and not in the metal itself. For the best casting metal you will find the following what you wish, and if you do not succeed in obtaining good work, something must be radically wrong with your methods.

Copper	88 lbs.
Tin	8 lbs.
Zinc	2 lbs.
Lead	2 lbs.
5% Phosphor Tin	1 oz.

Do not add any more phosphor-tin than the 1 oz. per 100 lbs., or pin holes will be apt to form. The small amount given, however, will serve to produce clean metal.

QUESTION NO. 634. Should brass jewelry that is to have a rose gold finish be copper plated before applying the gold deposit?

Answer. Yes. If you do not copper plate it, more gold will have to be used to obtain the desired color. The red color of the copper allows very little gold to be put on.

QUESTION NO. 635. How strong a current should be used in depositing rose-gold?

Answer. The current strength will depend upon the character of your solution. If it is low in conducting salts, then a strong current must be used (i. e., high voltage). As it is always customary to run a rose-gold solution hot, the usual current from a plating dynamo of 6 volts is all is required. From 3 to 6 volts are usually employed depending upon the heat of the solution and its strength. It is impossible to lay down any regular rule about it. Try yourself and find out what voltage gives the best results. The higher the voltage (which means a stronger current) the redder the gold deposit.

QUESTION NO. 637. Will you favor us with a cheap copper dip for producing a copper plate on iron and steel goods without electroplating?

Answer. The iron or steel to be coppered must be bright and then well cleaned from grease and oil in the usual manner. Then dip into the following solution:

Water	1 gallon.
Sulphate of Copper	1 oz.
Sulphuric Acid	1 oz.

As soon as the surface is coppered, immediately remove the articles from the dip, rinse in cold water, then in hot water and dry in sawdust. If the articles are afterwards given a short tumbling in sawdust they will become brighter, but this is not usually done. The articles are left as they come from the drying out sawdust.

Question No. 638. We find that some of our aluminum castings look pitted after they come out of the sand. They have the appearance of having very small pin-holes in them, particularly after any machine work has been done upon them. When polished, the polishing material fills the holes and renders the casting quite unsightly. We do not think our mixtures are at fault as we purchase the aluminum already alloyed from the leading maker or producer of aluminum alloys. What is the cause?

Answer. You have overheated your aluminum in melting or allowed it to remain in the fire for a long time after it has melted. Overheating is the worst error. When it is done, the aluminum absorbs gases from the fire (the products of combustion), and when the castings cool in the mold, these gases are expelled, with the formation of blowholes. Pin holes are only minute blowholes. If the aluminum has been only slightly overheated, the quantity of gas absorbed is small and pin-holes result in the casting; but if it is enormously overheated so much gas is taken up that large blowholes are produced. Aluminum castings containing pin-holes are of less strength and show less elongation than those free from them.

Question No. 639. We submit a sample buckle to you. The base metal of the buckle is brass, but it has been gold plated and the flower design on the surface has been colored with green and red shading. The buckle is a cheap one and to produce the finish there must be little expense. How is it done?

Answer. The green and red color on the flowers, raised on the surface of the buckle, was produced by the use of colored lacquer. This is applied with a small brush. The buckle was first dead dipped to produce a matt surface, then gilded and afterwards the colored lacquer applied. The method, therefore is a cheap one.

Question No. 640. What mixture can be used for casting the fittings of a soda water fountain? It must be a white metal of low melting point and which is not acted upon to any extent by fruit juices. It must be worked like brass and take a nice polish.

Answer. A britannia-metal mixture is usually employed for this purpose. Tin is the principal metal in it, and it is as non corrosive as any of the common metals. A good mixture for this purpose is the following:

Tin	87 lbs
Antimony	10 lbs
Copper	3 lbs.

The mixture may be made harder or softer by increasing or decreasing the amount of copper. It is not as strong as brass, nor is any soft metal mixture. The preceding mixture, however, may be readily cast in metal molds and takes a good polish. It is customary and necessary to silver plate such castings heavily before they are fit to use as the fruit syrups will act upon them to some extent.

Question No. 641. How can aluminum used on gun work be colored black so that it will be durable?

Answer. There is no satisfactory method of directly coloring aluminum black. It can be copper plated and then oxidized in liver of sulphur; but it is difficult, unless one is familiar with electroplating aluminum, to produce a copper deposit on it that will not blister. The most satisfactory method of producing black color, is to use a dead-black lacquer. This can now be obtained of a hard and excellent quality and is used extensively in blackening aluminum. The finish thus formed is very durable and pleasing. It may be said that it is the only satisfactory method known.

Question No. 642. I have several tons of scrap brass tubing. I suppose it is the so-called condenser tubing, as it is yellow and seems to have been badly corroded and much of it is quite brittle. I want to use it in making fancy trimmings, but when the castings are buffed up, small pits show. What is the method of melting and alloying the tubing so as to prevent it?

Answer. Old brass tubing is difficult to melt so as to make sound brass castings without melting it twice. There is so much surface exposed during the melting that the brass is oxidized to a large extent. We suggest melting the tubing and pouring into ingots, and then re-melting and pouring into your castings. Condenser tubing usually is composed of 61.5% of copper and 38.5% of zinc. In melting the old tubing, therefore, you will probably burn out enough spelter to make good casting metal. If the tubing is quite brittle, it will be found that a considerable amount of the zinc in it has been dissolved out by the sea-water. Such tubing will frequently run 80% in copper. In such a case, therefore, it will be necessary to add a small amount of spelter to the brass when melted. If, however, the tubing is good and tough, there is little change in its original mixture.

Question No. 643. What is the composition of electrotypers' wax used in taking an impression from type etc., and then copper plating the surface?

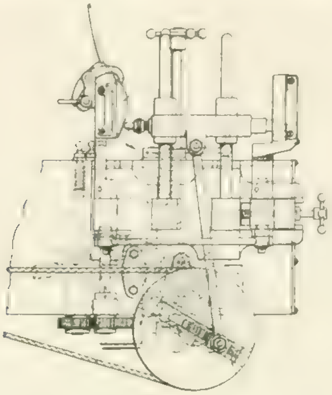
Answer. The mixture employed for this purpose is as follows:

Yellow Beeswax	8½ lbs
Venice Turpentine	1 lb
Plumbago	½ lb

The object of the Venice turpentine is to overcome the cone like structure of the beeswax. The wax then takes the impression without tearing. The plumbago must be fine and of the quality known as "Electrotypers' Plumbago" made for this purpose. In hot weather, half a pound of white Burgundy pitch is added to the preceding mixture if necessary, as it prevents the wax from becoming too soft. Unless the weather is very hot, it is usually not required.

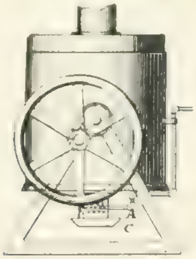
Patent Abstracts.

[illegible], Apr. 6, 1909. POLISHING MACHINE. Johann Reet of Dusseldorf, Germany. A machine for burnishing spoons, forks and other forms of plated ware. The work to be burnished is held by a clamp at 41 and a burnisher 1 is made to travel over the surface by suitable mechanism. In this instance a spoon 15 is shown while being burnished.

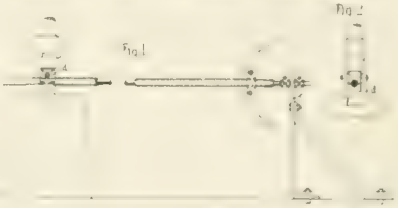


918,745, Apr. 20, 1909. AIR-BRUSH. Frederick J. Lederer, of Buffalo, N. Y. An air brush for spraying liquids. The essential feature of the invention lies in the manner in which the various parts are attached to one another so that they may be readily removed singly for cleaning.

917,460, Apr. 6, 1909. KEROSENE OIL BURNER. Ludwig T. Kuehl of Chicago, Ill. A burner for use on furnaces used for melting metals in crucibles. The burner is intended to burn kerosene oil. The burner is situated at A underneath the furnace and the flame of the burning oil envelops the crucible evenly. The burner is supplied with an over flow pan C. In the illustration the burner is shown attached to a tilting crucible furnace.



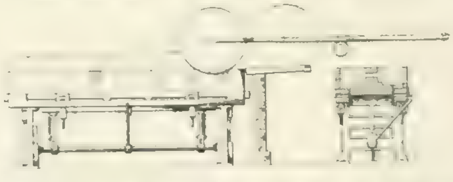
918,469, Apr. 13, 1909. APPARATUS FOR PRODUCING CORRUGATED TUBES. Alexander Pogany of Budapest, Germany. The feature of invention lies in the die d which is used with a mandrel. The mandrel inside of the tube at the die is made of such shape that the tube is not jammed. While it is being corrugated, the tube is turned and successively advanced.



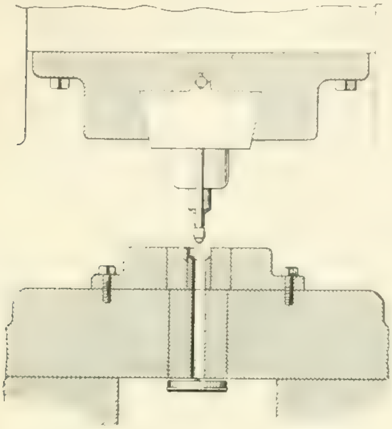
918,328, April 13, 1909. MOLD FOR HOLLOW ARTICLES. Edward Kerr and James Smith of Pittsburg, Pa. The mold is intended primarily for casting twyers and similar devices. The twyer is cast from the bottom and special appliances are employed for anchoring the core and venting it.

916,511, March 30, 1909. MOLDING-MACHINE. Max K. Weigel of Davenport, Iowa. Assignor to the Killing Molding Machine Co., of the same place. A molding machine in which the flask is withdrawn from the pattern and deposited upon the ground thus preventing injury to it. The machine is also arranged on a truck so that it may readily be moved. In addition the means for revolving the table have been improved.

918,551, Apr. 20, 1909. MOLDING-MACHINE. Walter H. Hoffman of New York City. The novelty of the machine is in the manner of ramming the flask. The sand is forced into it, and at the same time around the pattern, by a roller which rolls over the surface as shown in the illustration. The mechanism patented is for rolling the sand. It is claimed that the sand is thus rammed in a manner closely approaching that produced by hand work.



918,15, Apr. 13, 1909. METAL TUBE MACHINE. Leslie E. Hooker of Pawtucket, R. I. The punch and die, and manner of making brass cartridge shells. The novelty lies in the punch which is made so that the extrusion of the shell takes place from a cup-shaped blank instead of the usual disc. It is claimed that with the punch and die so constructed a lighter and stronger cartridge shell may be made.

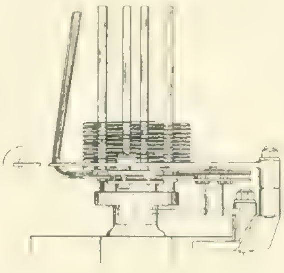


916,793, Mr. 30, 1909. PRODUCTION OF SILICON. Geo. O. Seward and Franz Von Kugelgen of Holcombs Rock, Va. Assignors to the Virginia Laboratory Co. of New York City. The method used is to heat a mixture of 75 parts of quartz and 25 parts of coke in an electric furnace. In this mixture there is no excess of carbon and by maintaining a suitable temperature it is possible to obtain the silicon in a pure and fused condition free from silicon carbide.

917,371, April 6, 1909. FLAT GATE FOR MOLDING MACHINES. Frank E. Smith of Marshalltown, Iowa. A set gate is used and then rammed up with the sand. It is then removed like a pattern after which the cope is lifted off and the pattern drawn. The principle of the invention lies in the gate pattern. It is intended more particularly for making iron castings.

918,501, Apr. 20, 1909. CORE ARBOR. J. H. Long and S. A. Milligan of Louisville, Ky. A core arbor for making Y shaped cores used in making pipes. The feature of the arbor is in the manner of detaching the arm. In other words, the arbor is made in two pieces to permit the removal without the necessity of breaking it as is frequently done.

918,425, Apr. 13, 1909. METHOD OF BENDING METAL STRIPS EDGEWISE. G. S. Dunn of East Orange, N. J. Assignor to the Crocker-Wheeler Co. of Ampere, N. J.

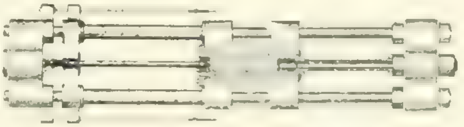


An appliance for bending strips of copper or other metals edgewise. The feature of the invention lies in the feeding method and manner of holding the coil while it is being bent.

916,665, Mar. 30, 1909. BUFFING-MACHINE. Harry J. Brewer of New York City. A device of a portable nature intended to be carried around and used for polishing the plugs used in the switchboards of central telephone offices. It involves nothing new in the buffing line and the novelty is in adapting it for this special work.

918, 049, Apr. 13, 1909. MACHINE FOR RESEATING VALVES. Robert H. Hazeltine of Ithaca, N. Y. A portable device for regrinding the valve seats of all kinds. The principle of the machine (which has the appearance of a breast-drill) is in the fact that the grinding disc does not make a complete turn, but stops when an arc of a circle has been made, returns, and then revolves again. The idea is to imitate hand grinding in the manner usually practiced.

916,875, Mar. 30, 1909. MACHINERY FOR PIERCING METALLIC BLOOMS OR INGOTS. W. C. Jackson and J. E. Joseph, assignors to the Weldless Steel Tube Co., of Birmingham, England. The billets are pierced by hydraulic pressure and are then used for cold drawing into tubing. The essential feature of the invention lies in the simultaneous movement of the billet and the mandrel.



Trade Items.

The Rutan Triple Duplex Valve Co., recently organized at Ithaca, N. Y., to manufacture valves, will make a special valve for controlling presses, hoists, elevators etc.

The Phoenix Artistic Bronze & Iron Foundry has been incorporated at Seattle, Washington, with a capital stock of $10,000 P. L. Richards and Leon Morel are the incorporators.

The United States Sherardizing Co., of Newcastle, Pa., have issued a license to the General Electric Co., of Schnectady, N. Y., for "Sherardizing" (dry-galvanizing) by their process

The Spokane Ornamental Iron & Wire Works, Spokane, Wash., are to build a new brass foundry and the capital stock has been increased from $25,000 to $100,000, to take care of this extension of their business.

The Hughson Steam Specialty Co., has succeeded the John Davis Co., of Chicago, Ill., and will manufacture steam regulator valves and steam specialties. The plant of the new company is at 5021 State St.

The Empire Foundry Co. of New Brunswick, N. J., are to rebuild the portion of their plant recently destroyed by fire. The nickel plating department was destroyed and this will be rebuilt and newly equipped.

The R. Wallace & Sons Mfg. Co., of Wallingford, Conn., are about to spend about $25,000 in carrying up three of their mills one story which will give them greater facilities for the manufacture of their plated and sterling-silver wares.

The Joseph Dixon Crucible Co., announce that they will be well represented at the convention of the American Foundrymen's Association to be held in Cincinnati beginning May 17th, and that their exhibit wll contain many new and interesting features

A new stove manufacturing concern called the Trenkamp Stove & Mfg. Co., has been organized in Cleveland, Ohio, with a capital stock of $75,000. The factory will be located on Quincy Ave., and will be 42 x 225 feet. Herman J. Trenkamp formerly of the Schneider & Trenkamp Co., and the American Stove Co., is connected with the new company

The plant of the H & H Mfg. Co., of 554 West 25th St., New York City, manufacturers of bath room fixtures, sheet metals goods and household hardware, and which recently went in a receiver's hands, has been purchased by Leo Schlessinger & Co., of 372 South St., New York City, manufacturers of stamped tin ware and household specialties The full line of plated goods made by the H & H Mfg. Co. will be continued as in the past

The Standard Wire Company of Newcastle, Pa., are installing machinery for the manufacture of tinned and galvanized wire baskets

I. S. Spencers' Sons of Guilford, Conn., hardware manufacturers, are increasing their plating department by new equipment.

The Nutmeg Fixture Mfg. Co., of Norwich, Conn., are now making a specialty of fixtures for tungsten lamps and manufacture them in old brass and other modern finishes

The International Silver Co., of Meriden, Conn., are to build an addition to Factory H in that city, to be used as a department for grinding and polishing cutlery

The U. S. Indestructible Gasket Co., manufacturers of copper and other metal gaskets, have moved from 16 South William St., New York City, to 50 Church St. They are now manufacturing gaskets of "Monel-Metal."

The Standard Brass & Bronze Company has been incorporated at Columbus, Ohio, to carry as a jobbing brass foundry. The capital stock is $10,000 The incorporators are O. W. Pletcher, M. K. Pletcher, T. Lehman and W. H. Knauss.

The Jones Automatic Measuring Pump Co., has been incorporated at Shelbyville, Ind., with a capital stock of $25,000, to manufacture a new self-measuring pump for oils, syrups, etc.

The Rochester Brass Bed Co., has been organized at Rochester, N. Y., with a capital stock of $40,000 to manufacture brass bedsteads. The organizers are W. F. Enders, M J. Isselhardt, A. Ploch, Leon Goldschmidt, F. Pfeffer, W. J. Maloney and A. Rodenburg.

The Bridgeport Metal Goods Mfg. Co., Howard Ave. & Spruce St., Bridgeport, Conn., recently incorporated to manufacture small metal wares, have already commenced manufacturing. The electroplating department is now fully equipped and operations have begun in it.

The plant of the Nichols & Langworthy Machine Co., at Hope Valley, R. I., was burned on April 13th, with a loss of nearly $200,000. The plant was completely destroyed. This company operated a brass foundry and lately has been turning out aluminum castings for use in marine engine worek.

The White Tar Company of 5 Front St New York City, with which Byrd Walker and J. J. Scheuch recently became identified, have issued a list of their products which they offer to the trade They are prepared to supply the trade with blue-vitriol, argols, soda-ash, caustic soda, zinc sulphate, zinc dust, sodium nitrate, sal ammoniac, caustic potash, water glass, and many other chemicals used in the metal trades

The Bailey-Filson Co., of Providence, R. I., manufacturers of novelty jewelry, have moved to 107 Friendship St.

The Rome Scale Company has been organized at Rome, Ga., with a capital stock of $12,500 to manufacture scales.

The Herath & Hultman Mfg. Co., 108 Church St., Schnectady, N. Y., manufacturers of electric railway equipment are to erect a new brass foundry at their plant.

A new brass foundry is being erected at 280-282 Chestnut St., Newark, N. J., for Auguse Griffoul, manufacturer of fine castings in brass, bronze, gold and silver.

A creditors petition in bankruptcy has been filed against the American Art Metal Novelty Co., of 304 East 23rd St., New York City. Thomas D. Hewitt has been appointed receiver.

The Charles E. Sholes Co., 164 Front St., New York City, are headquarters for chemicals of all kinds used in the electroplating and metal trades, such as potash, acids, ammonia, etc. They received the highest award for their exhibit of chemicals at the Jamestown Exhibition in 1907.

The W. S. Rockwell Co., 50 Church St., New York City, are now sending out to the trade their bulletin No. 2 describing the "Rockwell" Rotary Annealing and Hardening Furnace for the continuous annealing of small metal goods or for hardening steel goods. The furnace is heated by gas or oil and the operation is continuous.

The "Ideal" Tilting Crucible Furnace, manufactured by the Ideal Furnace Co. of Chester, Pa., does *not* use oil for fuel, but coke or coal so that it is adapted for immediate use without special equipment. The tilting feature, however, is used so that the crucible is not removed from the furnace and a long life is obtained. The cost of melting with the furnace is very low, and brass founders who prefer coke or coal will find this furnace to far exceed their expectations. Circulars, tests, etc., will be sent upon application and which will indicate the character of the furnace.

The Standard Brass & Copper Tube Co. has been incorporated under the laws of the State of Connecticut with a capital stock of $50,000 to manufacture seamless brass and copper tubing. A plant will shortly be built at New London, Conn., where the manufacturing will be carried on. The main factory will be of brick, one story high and 65x128 feet. Another building will be 18x32 feet. F. J. Loomis, formerly with the Benedict & Burnham Mfg. Co., of Waterbury, Conn., and more recently mechanical engineer with the National Conduit & Cable Co., of Hastings, N. Y., is identified with the company. It is said that about $22,000 worth of new machinery will be installed in the new plant.

The Lanyon Zinc Company of Iola, Kansas, one of the largest zinc smelters in the United States, have gone into the hands of a receiver. There will be no interruption of operations at the plant, and an early reorganization is expected.

The sash weight plant of the Vulcan Detinning Co., at Sewaren, N. J., was burned on March 30th, with a loss of $25,000. It will be rebuilt at once. This company strips the tin from tin-plate scrap and uses the iron scrap for making sash weights.

The Roth Bros. Co., of Chicago, Ill., through their New York representatives, Geo. F. Schminke, of 136 Liberty St., have equipped the factories of Lebold Bros., and Curtis & Schneider of 10 West 23rd St., manufacturing jewelers, with their motor driven polishing lathes.

The Cox Brass Mfg. Co., North Pearl and Van Woert Sts., Albany, N. Y., are now manufacturing soda fountains and fixtures and carry on silver plating in connection with the manufacture of these goods. This is a recent departure as they have heretofore made beer pumps and similar goods. They also conduct a brass foundry.

G. J. Nikolas & Co., 400-402 West Van Buren St., Chicago, Ill., have just issued a new and interesting catalogue of their lacquers. The catalogue is compiled in an excellent manner and each of their different grades of lacquer is described and the kind of work for which it is intended. Various other information about lacquers and their use is also contained in it.

The National Lead Company, 111 Broadway, New York City, have placed on the market a new kind of lead pipe called "Leadamant." It is an alloy of lead and antimony and is stronger and lighter than a pipe made of pure lead. The pipe is cheaper per foot than ordinary pipe as it does not weigh as much, although slightly higher in price. The lightness offsets the increase in cost. The pipe does not dent or sag as readily as soft lead, and resists the action of water and other liquids better.

The O. H. Jones Co., of East Hartford, Conn., manufacturers of plumbers' specialties and with a factory at Hockanum, Conn., have found it necessary on account of the increase in their business, to add a brass foundry to their plant. Hereafter they will manufacture their own brass castings. The brass foundry is in charge of Joseph W. Fox, an experienced foundryman, and formerly in charge of the brass foundry of Landers, Frary & Clark of New Britain, Conn. The officers of the company are O. H. Jones, president; A. [illegible], secretary and treasurer; H. A. [illegible], superintendent, and Lyman A. [illegible], assistant superintendent. Among the goods manufactured are high pressure ball cocks, glass floats and [illegible] patented by O. H. Jones.

The Waterbury Rolling Mills, Inc., have awarded the contract for a large addition to their works. Two more stands of rolls are also to be installed. They will then be able to take care of their increased business.

The Driver & Harris Wire Company of Harrison, N. J., have been granted the right for manufacturing wire and ribbon of Monel Metal by the Orford Copper Co. A new rolling mill for rolling rods has been equipped by the Driver Harris Company for taking care of this new business.

The Harshaw, Fuller & Goodwin Company of Cleveland, Ohio and 100 William St., New York City, are now manufacturing copper and zinc anodes of a quality equal to their well known nickel anodes. Consumers should correspond with them before ordering their supply.

The Liquid Carbonic Co., of Chicago, Ill., manufacturers of soda fountains, have purchased 38 acres of land at 31st St and Hoyne Ave., in that city and will erect a new plant upon it. The plant will include both brass and iron foundries and new plating departments.

A new plant will be erected in Alexandria, Ind., by the Alexandria Metallic Bed Company, manufacturers of metallic beds. The company has received a free site and a bonus of $10,000 for establishing their plant in that city. The factory will be located on the site formerly occupied by the Kelly Ax Mfg. Co.

The Latrobe Foundry Co., of Baltimore, Md., recently organized by Frederick O. Latrobe, Jr., and John Shane, have started an iron and brass foundry at Allan and Clements Sts., in which 5 tons of gray-iron and 1 ton of brass castings will be made per day. The plant is 55 x 167 feet and jobbing will be carried on as well as the manufacture of apparatus for chemical works.

The Chase Corporation has been incorporated in Waterbury, Conn., with a capital stock of $5,000,000 by H. S. Chase, F. S. Chase and Irving Chase, all of Waterbury. This company is intended as a holding one and will not engage in manufacturing. It will, it is reported, become identified with the Waterbury Clock Co., the Waterbury Mfg. Co., and the Chase Rolling Mill, all of which are known as "Chase" organizations.

The Architects Standard Bronze Co. of 1 Madison Ave., New York City, have now perfected their process for electroplating wood, plaster, lace, leather, paper and other non-metallic substances with copper or other metals so that they will have the appearance and lasting qualities of solid metal. They will build a large plant at Greenpoint, L. I. for carrying on the work. It is also reported that plants will be built in other large cities. One of the features of the process is that wood can be made repoussé and ornamental at the same time by the metallization.

The new building erected by the Iddings Company of Warren, Ohio, will be used as a nickel plating department.

The Aeolian Company of Meriden, Conn., manufacturers of aeolians, have installed an electroplating plant in their works to take care of the metal parts used in their products.

The New Haven Novelty Co., has begun the manufacture of hardware and metal novelties at 28 Whitney Ave., New Haven, Conn. Wm. Hurley and Henry Mardt are connected with the company.

The Joseph Reinbold Bronze Co., recently incorporated in Newark, N. J., to make fine bronze and brass castings, have opened a brass foundry in the Hildner Bldg., on Washington St., in that city.

The New York office of the American Tube Works of Boston, Mass., manufacturers of seamless copper and brass tubing, has been moved from 20 Gold St., to 11 and 13 Cliff St.

The R. P. K. Pressed Metal Co., recently started in Bridgeport, Conn., are now manufacturing a pressed steel shoe tree. The electroplating of their goods is done by outside concerns.

The Ashton Valve Co., of Boston, Mass., manufacturers of safety valves and steam gauges, are moving to their new works at East Cambridge, Mass. The works are on First St., and the brass foundry is 30 x 60 feet.

The new brass foundry of the Bay View Foundry Co., of Sandusky, Ohio, which has been in course of construction for some time, is now completed and will shortly be operated. The brass foundry occupies some 1,300 sq. feet. This company make a specialty of automobile and gas engine cylinders, and similar classes of goods and now have both iron and brass foundries.

The Abbott Ball Company, 14 Hicks St., Hartford, Conn., are now manufacturing steel balls expressly for tumbling metals. They are made after a new process invented by Geo. R. Abbott who has made a study of the requirements of steel balls for burnishing metal goods by tumbling. The balls which they manufacture for this purpose are made for such work, and will be found to give the desired results in producing a polished surface on metals by tumbling.

The Bridgeport Deoxidized Bronze & Metal Co., of Bridgeport, Conn., are one of the largest jobbing brass foundries in the United States and number among their customers many of the leading manufacturers in this country. They make brass, bronze and aluminum castings for the jobbing trade and their foundry is equipped with the most modern machinery for this purpose. Their equipment of molding machines renders it possible for them to turn out castings of a quality and at a price that will surprise many consumers.

The Perry-Fay Co., of Elyria, Ohio, screw manufacturers, are to double the capacity of their plant.

W. H. Daycock, Jr., of 81 Fulton St., New York City is now representing the Buffalo Copper & Brass Rolling Mills in the East.

The Malleable Iron Range Co., of Beaver Dam, Wis., stove manufacturers, are to build large additions to their plant.

The Detroit Faucet Company has been incorporated in Detroit, Mich., to make faucets of metal and wood.

The Buckeye Aluminum Company of Doylestown, Ohio, manufacturers of aluminum hollow-ware, will move to Moundsville, W. Va., and will erect a new plant.

It is reported that the Biggins-Rogers Co. of Wallingford, Conn., manufacturers of silver plated hollow-ware, are to enter into the manufacture of sterling silver wares.

The American Manganese Bronze Co. of Philadelphia, Pa. have issued a new booklet describing their manganese-bronze and other products.

Higgins & Seiter, 50 West 22nd. St., New York City, the well known dealers in china, glassware and other similar wares, are to commence the manufacture of silver-deposit wares. The plant will be at the above address, but has not yet been fitted up. They expect to commence manufacturing not later than August.

The Bristol Co. of Waterbury, Conn., manufacturers of the "Bristol" Recording Instruments and electric pyrometers, are sending out to the trade their new Bulletin 103 which describes a few of their well known instruments especially adapted for furnace work. This as well as any of their publications will be sent to any one interested in the accurate measurement of heat.

The Franklin H. Kalbfleisch Co. of New York City, the well known manufacturers of chemicals and lacquers, have opened an office and warehouse in Providence, R. I. It is located at 221 West Exchange St. and is in charge of V. P. Davis, a man of experience in this line of trade. A full line of chemicals will be carried and their arsenic-free acids, now so extensively used for dipping, can be obtained in that section without delay. The advantage of such acids is well known.

The new catalogue of the Jonathan Bartley Crucible Co. of Trenton, N. J. is now being sent out to the trade. It is one of the most extensive treatises on crucibles yet published and represents the work of Jonathan Bartley who compiled it with the intention of supplying information about crucibles not heretofore published. The catalogue is 7 x 10 inches and contains 34 pages. It is illustrated with [illegible] reproductions from photographs and contains much interesting information on graphite mining in Ceylon.

Boston papers announce for the first time that a World's Fair will be held in Boston, Mass., in 1920 to commemorate the landing of the Pilgrims in New England in 1620.

The Wheeling Stamping Co., of Wheeling, W. Va., are to commence the manufacture of metal collapsible tubes. They are also installing a plant for lithographing on tin for making small tin boxes for the drug trade.

Personal.

James Savage, of Detroit, Mich., is now foreman of the foundries of the Bridgeport Deoxidized Bronze & Metal Co.

A. Van Winkle, president of the Hanson & Van Winkle Co., of Newark, N. J., has returned from his trip abroad.

Thomas F. Jordan, formerly foreman of the plating department of the Edward Miller Company of Meriden, Conn., is now connected with August Goertz & Co., 276 Morris Ave., Newark, N. J., in a similar capacity.

J. C. Rock, formerly foreman of the brass foundry of the Bridgeport Deoxidized Bronze & Metal Co., Bridgeport, Conn., has accepted a similar position with the Whitlock Coil Pipe Co., of Hartford, Conn.

Henry M. Dawson is now in charge of the plating department of the Bridgeport, Brass Co., Bridgeport, Conn. The position having been made vacant by the resignation of Chas. Phillips, now superintendent of the Bridgeport Metal Goods Mfg. Co.

Obituary.

William H. Wahl, the well known metallurgist and author, died on March 23rd in Philadelphia, Pa., at the age of sixty-one. He was secretary of the Franklin Institute for many years and an author of wide reputation. He was the author of *Galvanoplastic Manipulations,* a standard treatise on the art of electroplating.

Andrew Mason, who for twenty-five years was at the head of the United States Assay Office in New York City, and was in the employ of the Government for nearly sixty years, died on April 28th, aged 80 years. He began his career as assistant assayer and afterwards became the head of the institution where all the gold was refined by the Government. He was the inventor of the so-called sulphuric acid process for parting gold and silver. Before his discovery, nitric acid was used, but by the substitution of sulphuric acid, the Government was annually saved many thousands of dollars. Mr. Mason refused to patent the process as he claimed it belonged to the Government. In return he received the thanks of Congress and a payment of several thousand dollars.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Acetone, pure, 98 99%	℔	.22
Acid, Acetic, pure, 30%	℔.	.07
Acid, Arsenious (White Arsenic)	℔.	.20
Acid, Benzoic	℔.	.55
Acid, Boracic (Powd.), pure	℔.	.12
Acid, Hydrochloric, see Acid, Muriatic		
Acid, Hydrofluoric, 30%	℔.	.04
Acid, Hydrofluoric, 50%	℔.	.10
Acid, Muriatic, 20	℔.	.02
Acid, Muriatic, c.p., 20°	℔.	.07
Acid, Nitric, 38°	℔.	.05⅝
Acid, Nitric, 40	℔.	.05⅞
Acid, Nitric, 42°	℔.	.06¼
Acid, Nitric, c p	℔.	.08
Acid, Sulphuric, 66	℔.	.01¾
Acid, Sulphuric, c p	℔.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	℔.	.04
Aluminum, Sulphate	℔.	.06
Aluminum, Metallic, in ingots	℔.	.24
Aqua Fortis, see Acid, Nitric		
Ammonia Water (Aqua-Ammonia), 20	℔.	.04¾
Ammonia Water (Aqua Ammonia), 26	℔.	.06¼
Ammonia Water, c p	℔.	.08
Ammonium Carbonate, lump	℔.	.15
Ammonium Chloride (Sal Ammoniac)	℔.	.12
Ammonium Hydrosulphuret	℔.	.30
Ammonium Sulphate	℔.	.07
Ammonium Suphocyanate	℔.	.50
Amyl Acetate	gal.	1.85
Antimony	℔.	.08¼
Antimony Chloride (Butter of Antimony)	℔.	.23
Arsenic, Metallic	℔.	.15
Arsenic, White (Acid Arsenious)	℔.	.20
Argols, White (Cream of Tartar)	℔.	.31
Asphaltum, Commercial	℔.	.05
Asphaltum, Egyptian (Bitumen)	℔.	.30
Benzine	gal.	.20
Benzol, Pure	gal.	.75
Bismuth, Metallic	℔.	1.75
Bitumen, see Asphaltum.		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	℔.	.10
Borax Glass	℔.	.35
Cadmium, Metallic	℔.	.75
Carbon Bisulphide	℔.	.10
Calcium Carbonate (Precipitated Chalk)	℔.	.10
Chrome Green	℔.	.50
Copper, Lake (cask)	℔.	.13¼
Copper, Lake (carload)	℔.	.13
Copper, Electrolytic, (Carload)	℔.	.12¾
Copper, Electrolytic (cask)	℔.	.13⅛
Copper, Casting (carload)	℔.	.12½
Copper, Casting (cask)	℔.	.13
Copper Acetate (Verdigris)	℔.	.35
Copper Carbonate, dry	℔.	.25
Copper Sulphate (Blue Stone)	℔.	.09
Copperas, see Iron Sulphate.		
Corrosive Sublimate, see Mercury Bichloride.		
Cream-Tartar, see Potassium Bitartarate.		
Cryolite	℔.	.12
Cyanide, see Potassium Cyanide.		
Dextrin	℔.	.15
Emery Flour	℔.	.04
Emery, F F & F F F.	℔.	.03
Flint, powdered	℔.	.01
Fluor Spar	℔.	.01¼
Fusel Oil	gal.	1.75
Gelatine, Nelson's	℔.	1.15
Gold Chloride	dwt.	.60
Gum Copal	℔.	.30
Gum Damar	℔.	.30
Gum Elemi	℔.	.70
Gum Guiacum	℔.	.26
Gum Mastic	℔.	.70
Gum Sandarac	℔.	.35
Gum Shellac, brown	℔.	.50
Gum Shellac, white	℔.	.60
Iron Perchloride	℔.	.25
Iron Sulphate (Copperas)	℔	.05
Lead Acetate (Sugar of Lead)	℔	.15
Lead, Pig	℔	.04¼
Lead, Red	lb.	.12
Lead, Yellow Oxide (Litharge)	℔.	.12
Liver of Sulphur, see Potassium Sulphide.		
Manganese, Ferro, 80%	℔.	.10
Manganese, Metallic, pure	℔.	.75
Magnesium, Metallic	℔.	1 25
Mercury Bichloride (Corrosive Sublimate)	℔.	.93
Mercury, Metallic (Quick Silver)	℔.	.89
Mercury Nitrate	℔.	1.50
Mercury Oxide, yellow	℔.	1.80
Nickel and Ammonium Sulphate (Double Salts)	℔.	.16
Nickel Carbonate, dry	℔.	.60
Nickel Chloride	℔.	.50
Nickel, Metallic	℔.	.47
Nickel Sulphate (Single Salts)	℔.	.25
Nitre (Saltpetre), see Potassium Nitrate.		
Oil, Palm	℔.	.08
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	℔.	.15
Pearlash, see Potassium Carbonate.		
Phosphorus, yellow	℔.	.40
Phosphorus, red	℔.	1.10
Pitch	℔.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	12.50
Platinum, Metallic	oz.	23.50
Potash-by-Alcohol, in sticks	℔.	.50
Potash, Caustic (Potassium Hydrate)	℔.	.08
Potassium Bichromate	℔.	.14
Potassium Bitartarate (Cream of		
Potassium Carbonate (Pearlash)	℔.	.10
Potassium Chlorate	℔.	.15
Potassium Cyanide	℔.	.25
Potassium Iodide	℔.	2.25
Potassium Nitrate (Nitre or Saltpetre)	℔.	.10
Potassium Permanganate	℔.	.17
Potassium, Red Prussiate	℔.	.60
Potassium, Yellow Prussiate	℔.	.24
Potassium Sulphide (Liver of Sulphur)	℔.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	℔.	.70
Tartar)	℔.	.31
Pumice, Ground	℔.	.05
Quartz, Powdered	℔.	.01
Rosin, Yellow	℔.	.04
Sal-Ammoniac, see Ammonium Chloride.		
Sal-Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Fine	oz.	.50¼
Silver Nitrate, crystals	oz.	.50
Soda-Ash	℔.	.05
Silver, Fine	oz.	.52⅞
Sodium Biborate, see Borax.		
Sodium Bisulphite	℔.	.15
Sodium Carbonate (Sal-Soda), crystals	℔.	.02
Sodium Hydrate (Caustic Soda)	℔.	.05
Sodium Hydrate (Caustic Soda) by Alcohol (in sticks)	℔.	.45
Sodium Hyposulphite ("Hypo")	℔.	.04
Sodium, Metallic	℔.	.90
Sodium Nitrate	℔.	.05
Sodium Phosphate	℔.	.09
Sodium Silicate (Water Glass)	℔.	.04
Soot, Calcined	℔.	.15
Spelter, see Zinc.		
Spermacetti	℔.	.40
Sugar of Lead, see Lead Acetate.		
Sulphur (Brimstone), in lump	℔.	.05
Tin Chloride	℔.	.43
Tin, Metallic	℔.	.28¾
Turpentine, Venice	℔.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water-Glass, see Sodium Silicate		
Wax, Beeswax, yellow	℔.	.45
Wax, Carnauba	℔.	.70
Wax, Japan	℔.	.20
Whiting (Ground Chalk)	℔.	.02
Zinc Carbonate, dry	℔	.19
Zinc Chloride	℔.	.12
Zinc Sulphate	℔.	.06
Zinc (spelter)	℔.	.05¼

THE
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Why Charcoal Should be Used in Melting Brass.

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Every brass rolling mill, without exception, whose product is of a higher grade than that of the brass foundry, uses charcoal in melting. Its function is to prevent the oxidation of the metal during the melting.

While brass rolling mills, the most important and the largest part of the brass industry of the United States, thoroughly appreciate the value and need of charcoal in melting, the brass foundry trade, except in a minor number of instances, does not appear to understand the necessity for using it. It is quite a frequent occurrence to find many brass foundries, particularly in sections of the country other than the East, in which charcoal has never been used. It usually follows that the product of such foundries is inferior to those in which charcoal is used.

The object of using charcoal in melting brass or copper is to prevent the oxidation of the metal. Copper, particularly, needs it as it oxidizes rapidly while melting and absorbs its own oxide. The absorption of oxide causes the surface of the copper to become clear while in the molten condition and an ideal condition is presented for oxidation, and absorption of gas and sulphur.

Small coal or coke is frequently used in place of charcoal, but is [illegible] on account of the presence of sulphur in them. Repeated trials have demonstrated that the quality of the melted metal is invariably the best when charcoal is used.

The advantage of charcoal in melting lies in its absolute freedom from sulphur and hydrocarbons, and at the same time it [illegible] readily, thus supplying a reducing atmosphere. To obtain the best results it should be crushed to small size and slightly damp. A small quantity should be placed in the bottom of the crucible, before the metal is put in, and more as soon as it begins to melt. At all times the molten metal should be well covered with it. We advocate its use under all conditions, as it will not only improve the quality of the castings, but reduce the melt loss.

The question has frequently been asked, why sawdust will not answer equally as well as charcoal. It can be used, if desired, but it is almost too fine to remain on the metal if there is a strong draught, but it is better than nothing at all. Charcoal is not expensive, however, and when the quality of the metal and reduction of the melt loss are taken into consideration, it is cheaper to use it than to attempt to do without it.

Cause of Rough Deposits in Acid Copper Solutions.

As few platers ever have occasion to use the acid copper solution in their work, its peculiarities are not as generally understood as those of other solutions. This solution, however, is becoming more and more extensively used, as it has been found that it has many advantages for certain classes of work, and particularly in instances where a heavy deposit is necessary. This solution is practically the only one that can successfully be used for such work.

The main difficulty in running acid copper solutions is met in the formation of a rough and warty deposit, particularly on the edges and corners of the work. In fact, it is about the only trouble experienced.

The cause of the rough deposit is the presence of too much sulphuric acid in the solution. In making it up it is customary to use a small quantity, and the majority of platers [illegible] acid too much. The [illegible] method used by electrotypers, where [illegible] attention is paid to the character of the copper deposit as the [illegible] is used and the mould filled with soft metal to back it up. For regular work, the amount of acid in the solution should be low. In making it up do not add more than enough to make it over 1 degree Baumé more than the sulphate of copper solution itself.

In running an acid copper solution, the copper is deposited very rapidly and is usually not dissolved from the anodes equally as rapidly, especially if an insufficient number of anodes are used. The acid, therefore, keeps increasing until the solution gives a very rough deposit. There are few acid copper solutions in which this does not follow if they are run "hard."

The remedy for the rough deposit, if it is not a "burnt" one, and this may easily be ascertained by the appearance, is to neutralize the acid by means of carbonate of copper. The result is the neutralization of the acid in the solution with the formation of sulphate of copper, and the conditions then become normal and the deposit will be smooth.

Pyrophosphate of Soda in Electroplating.

A number of formulas are in use for electroplating in which pyrophosphate of soda is used. They were first used by Roseleur and published first in his treatise on the electrodeposition of metals. It is used particularly in the preparation of the well-known pyrophosphate solution for the electro-deposition of tin, and in making a gold bath for gilding by dipping. Both of these solutions are excellent.

Pyrophosphate of soda is not the same as phosphate of soda and one cannot be used in place of the other in making up the solutions. Pyrophosphate of soda is made by heating ordinary phosphate of soda (tri-sodium phosphate) to a white heat in a crucible.

Pyrophosphate of soda has the property of dissolving certain substances which the ordinary phosphate of soda will not, and for this reason is used in making up solutions for electroplating. As platers inexperienced with chemistry are not familiar with the difference between the two kinds, care should be taken by [illegible] that the actual pyrophosphate is obtained when desired. Otherwise, as many [illegible] have found to their regret, the solution cannot be made up.

The Convention of the Foundrymen's Association at Cincinnati.

The fourteenth annual convention of the American Foundrymen's Association, and the allied American Brass Founders' Association, Foundry Supply Association and Associated Foundry Foremen, which took place at Cincinnati, Ohio, during the week following May 17th, was the most successful of any yet held. The attendance was over 2000.

J. J. Wilson, of the Cadillac Motor Car Co.; and A. P. Ford, of the Crane Co., Bridgeport, Conn., presented the following officers, who were elected:

President: William R. Webster, of the Bridgeport Brass Co., Bridgeport, Conn.

Vice-Presidents: E. O. Goss, of the Scovill Mfg. Co., Waterbury, Conn.; A. H. Warner,

Fig. 1. View of Cincinnati from Newport, Kentucky Across the Ohio River.

A number of interesting papers were read, some of which are herewith published, and a large number of exhibits were shown. The convention and exhibition were held in the Music Hall, in which ample room was had for this purpose. The annual business meeting of the American Brass Founders' Association was held and the nominating committee consisting of Dr. F. T. F. Stephenson, consulting chemist, of Detroit; A. L. Haasis, of the Joseph Dixon Crucible Co.; [illegible] Colman, of the J. D. Smith Foundry Supply Co.

of the F. E. Stebbins Mfg. Co., Springfield, Mass.; W. L. Abate, of the Nathan Mfg. Co., New York City; Thos. Evans, of the Thos. Evans Mfg. Co., Philadelphia, Pa.; L. W. Olson, the Ohio Brass Co., Mansfield, Ohio; J. N. Gamble, National [illegible] Co., Kewanee, Ill.; W. D. Allen, W. D. Allen Mfg. Co., Chicago, Ill.; J. [illegible] [illegible] & Sons Brass Works, Chattanooga, Tenn.; N. K. B. Patch, the Lumen Bearing Co., Toronto, Canada; Richard R. [illegible], Robert Mitchell Company, Montreal, Canada.

Secretary and Treasurer: W. M. Corse, Michigan Smelting and Refining Co., of Detroit, Mich.

A Committee on Standardization was appointed, consisting of the Secretary, W. M. Corse, Arthur D. Little, of Boston, Mass., and Erwin S. Sperry, of Bridgeport, Conn., who will endeavor to standardize the methods in use for the analysis of brass and kindred alloys. This committee will co-operate with Dr. W. F. Hildebrand, of the United States Bureau of Standards in carrying out the work.

The Foundry Supply Association held their annual meeting and the following officers were elected:

President: F. N. Perkins, of the Arcade Mfg. Co., of Freeport, Ill.

Vice-Presidents: F. B. Stevens, of Detroit, Mich.; R. S. Buch, A. Buch's Sons, Elizabethtown, Pa.; S. T. Johnston, The S. Obermayer Co., Cincinnati, Ohio; Wm. Lodge, Lodge & Shipley Machine Tool Co., Cincinnati, Ohio.

Secretary: C. E. Hoyt, Lewis Institute, Chicago.

Treasurer: J. S. McCormick, J. S. McCormick Co., Pittsburgh, Pa.

Trustees: E. A. Pridmore, Henry E. Pridmore, Chicago; George H. Wadsworth, Falls Rivet & Machine Co., Cuyahoga Falls, Ohio; H. R. Atwater, Osborn Mfg. Co., Cleveland; E. J. Woodison, Detroit Foundry Supply Co., Detroit.

The next meeting of the associations will be held in Detroit, Mich., in 1910.

The following is a partial list of the concerns having exhibits:

The Monarch Engineering Co., of Baltimore, had their "Steele-Harvey" furnaces in continuous operation and melts were frequently poured. The exhibit was in charge of H. D. Harvey and Jas. A. Fowler.

The exhibit of the Jonathan Bartley Crucible Co. was extensive and a complete line of graphite crucibles and other graphite products were shown. Both Mr. Bartley and Mr. Lawton, of the company, were in constant attendance.

The Rockwell Furnace Co., of New York, had an extensive exhibit of their furnaces, some of which were maintained in actual operation. Their exhibit comprised both the crucible and rotary types of melting furnaces. A number of other appliances made by the company were also shown. The exhibit was in charge of W. S. Quigley.

The S. Obermayer Co., of Cincinnati, Ohio, had two exhibits showing their full line of foundry equipment and supplies. A new type of tool for foundry use manufactured by the Cincinnati Electrical Tool Co., created much interest. The extensive force of this company was in constant attendance and explained the features of the products of the company.

The exhibit of the Joseph Dixon Crucible Co. was of their customary standard and the large and complete line of wares which this company manufactures was shown. Practically the entire selling force of the company was represented, and many novelties were distributed as souvenirs.

The exhibit of the Hawley Down Draft Co. showed their regular type of "Schwartz" furnace and also their new type of furnace, the "Reyelbec," which uses coal or coke for the fuel and melts the metal in a crucible. Two exhibits were shown and in one, furnaces were constantly operated to show the manner of melting in them.

The Metal Dross Economy Co., of Bristol, Conn., had an exhibit of their skimming device for recovering metal from brass skimmings. The features of the trough used for this purpose were explained by W. H. Carpenter and A. L. Haasis, of the company.

Among the other exhibitors were the following: The Tabor Mfg. Co., with working exhibits, and their new power jarring and roll-over machine. The J. W. Paxson Co., with an extensive exhibit of their products and specialties. The M. R. V. Furnace, controlled in the United States by J. B. Wise, of Watertown, N. Y., was in actual operation. F. B. Stevens, of Detroit, Mich., had a complete line of foundry supplies manufactured by him. The J. D. Smith Foundry Supply Co. had their customary high grade exhibit of foundry supplies. The Hill & Griffith Co. showed an excellent line of foundry supplies and specialties. Carborundum products of all kinds were on exhibition at the display of the Carborundum Co. Extensive demonstrations of molding machinery and appliances were shown by the E. H. Mumford Co., the Berkshire Mfg. Co., H. E. Pridmore, the Gravity Molding Machine Co., E. Killing's Molding Machine Works, and the Osborn Mfg. Co. The Arcade Mfg. Co., of Freeport, Ill., had a very extensive exhibit showing their machines in operation on a large scale.

Core machines were exhibited by the Falls Rivet & Machine Co., the Brown Specialty Machinery Co., and the Diamond Clamp & Flask Co. Core compounds were shown by the Millers' Products Co., Holland Linseed Oil Co., and the Robeson Process Co.

The W. W. Sly Mfg. Co. showed examples of their tumbling barrels, cinder mills, etc. Exhibits of foundry supplies were also shown by the Detroit Foundry Supply Co., Oscar Barnett Foundry Company, Diamond Clamp & Flask Co., J. S. McCormick Co., Whiting Foundry Equipment Co., and the Hauck Mfg. Co. The Kroeschell Schwartz crucible melting furnace was exhibited at the booth of the Kroeschell Bros. Co.

Metal exhibits were made by the Goldschmidt Thermit Co., S. Birkenstein & Sons, and the American Smelting & Refining Co. Stanley Doggett had an excellent exhibit of foundry specialties such as parting, charcoal manganese dioxide, etc. The Foundry Specialty Co., of Cincinnati, Ohio, also showed their parting compounds for iron and brass and fluxine for treating these metals.

Some of the papers read at the meetings held during the week are the following:

Fig. 2. View of the Cincinnati Music Hall where the Fourteenth Convention of the American Foundrymen's Association was Held.

The Manufacture of Red Brass Ingot; Its Uses and Advantages.

By W. M. Corse.

Ingot brass is not a new product. Ask any experienced foundryman and he will tell you that it is a material which is made up after the formula of sausage and is liable to contain as many things that are bad for brass as army canned beef once did for the soldier. He had good grounds for this opinion and he must not be considered an "old fogy" if he sticks to it tenaciously, for it is only within a few years that this stigma on ingot brass has begun to be removed and these cases are just beginning to attract serious attention.

The reason that ingots were [illegible] is the fact that most of them were made from skimmings, grindings and low grade borings, which had no other ready market. These were generally sold at lower prices to attract the foundryman. The result of this practice gave ingot brass a bad name.

To overcome this prejudice, experiments have developed the following method with good results: It consists in using a mixture of red brass borings and copper together with any white metals that may be necessary to bring the mixture to a definite composition. Some ingot makers use a certain percentage of brass washings, while others consider a strictly high grade metal should not carry washings in its mixture.

We will assume that the ingot is to be made from borings and copper only. Experience has shown that brass ingot made from the average borings alone as found on the market is often unsuited for good castings. This condition is due to the oxidation of the finely divided metal during melting and to the excess of impurities generally present. To overcome this a certain percentage of new metal must be added. This is generally copper, either in the form of ingot, wire or clippings. The amount added varies according to the composition of the borings used, but is generally from [illegible] per cent to 35 per cent of the melt. This addition of new metal makes an ingot that can be readily cast into sound clean castings which are easily machined.

The borings are first dumped on the floor each barrel being carefully inspected for aluminum, manganese, bronze and other detrimental material before being added to the main pile. The usual weight for such a pile is from 20 to 25 tons. This pile is next thoroughly mixed preferably by means of a mechanical mixer. When the mixing is finished a sample barrel of at least 500 pounds is taken from different portions of the pile in such a way that it will be thoroughly representative of the lot. This sample is run through a magnetic separator to remove the iron particles. Then the metal is melted in a [illegible] crucible with the proper fluxes, thoroughly stirred, skimmed and poured into ingots. Several of the ingots are drilled and the drillings sent to the laboratory for analysis. From the analysis the amount of copper and other metals needed to bring the ingot to the formula desired is calculated. Even though the [illegible] the material the percentages desired. [illegible] is made up with the addition indicated by the first analysis and this analyzed in order to be sure that the formula will give the composition wanted. Ingot is made as carefully as above described should have an average variation in the copper content, for example, of not more than .35 per cent. From this we can see that such an ingot can be used in particular work, that is, where the composition must be maintained within certain relatively close limits.

As indicated previously, the cost of ingot brass is generally from [illegible] to [illegible] of a cent a pound less than the same composition made from new metals. This enables the foundryman to give for the same price a better metal than his competitor can give who is not using ingot brass; or what amounts to the same thing, it enables the foundryman to produce his castings at a lower cost.

In order to standardize both the cost and the composition so that the stocks carried, both by the consumer and the smelter, may be low, a standard formula ingot is generally made up. This formula is approximately 82 per cent copper, [illegible] per cent tin, 6 per cent lead and 8 per cent zinc. As all these metals carry impurities even in the virgin state, a certain allowance must be made for these when buying on chemical analysis. The total impurities should not exceed 1 per cent. Variations in composition are also allowed for in the specifications, for it is impossible to make an exact formula even with new metals. A standard specification might be as follows:

Copper within	.5 %
Tin within	[illegible]
Lead within	1 %
Zinc within	[illegible]
Iron less than	.35
Antimony less than	.35%

Or it may be stated as:

Copper not less than	82
Tin not less than	4 %
Lead not more than	7 %
Zinc not more than	[illegible] %
Impurities not more than	[illegible] %

It is difficult to say what amounts of impurities are permissible, because what is harmful for one mixture or class of castings may not injure another class in the slightest. Several investigations have shown me, however, that the amounts of impurities mentioned are harmless. Furthermore, as methods of analysis are perfected, it sometimes happens that a definite amount of a metal present may give different results with the different methods. This has been proven in the case of iron. What was supposed at first to be an accurate method for iron gives only about 50 per cent. of the iron shown by another and evidently more accurate method. The iron was present nevertheless in both cases and the foundryman obtained equally as good results with the metal. This instance goes to show that the consumer and smelter must stand ready at any time to change their conceptions of the harmful amount of an impurity as more accurate chemical work gives them the true content. Comparatively little work has been done in a practical way to determine the upper limits of impurities that may safely be allowed, but as we progress farther along the lines of exact knowledge by the help of the testing laboratory, we shall soon be in a position, I hope, to give more accurate information on this subect.

Some of the first questions naturally asked are: How can the smelter afford to sell an ingot brass below the cost of new metal; and why can a smelter produce a better ingot than the brass founder can make himself? In answer to the first, I would say that buying any material in large quantities at all times generally enables a concern to buy for less money, and also a concern whose business it is to buy continually can get the class of material needed to better advantage. Regarding the second question, I would say that the average foundry can not afford to carry in stock enough borings of the various kinds needed to make a good ingot because of the

Fig. 3. The Suspension Bridge Connecting Covington, Kentucky and Cincinnati and Spanning the Ohio River. The First Bridge to be Built and Cost nearly $2,000,000.

large amount invested. Furthermore, all borings do not run alike so that, as they are found on the market, it is often necessary to mix as many as three or four lots to make the desired composition without adding too much new metal. The addition of new metal, especially copper, is necessary to make a first class ingot, but in amounts over 35 per cent it increases the cost so that no saving can be made, a result not to be desired by either consumer or smelter. Then again, the average founder would have to melt relatively small amounts, which would necessitate an increased number of analyses and would increase the shrinkage in melting. All of these things would increase the cost to him, by increasing his fuel, cost of handling and loss of metal. Many ingot makers specify copper and tin content only, giving no guarantee as to what the balance of the formula may be. The consumer should demand a complete analysis for we are coming to see that in brass, as well as in iron and steel, the impurities may determine the quality to a greater extent than the main constituents. All the elements present in small amount may not be impurities, for the intentional addition of metals like nickel, manganese and vanadium is often made, giving decided advantages to the physical properties of the resulting alloy.

So little work has been done in this field, especially in alloys containing more than two metals, that one cannot predict what will develop within the next few years. The iron and steel industry has given us many examples of the value of this sort of investigation and metallurgists are beginning to apply the same principles to the non ferrous alloys with very interesting results. This only goes to emphasize the fact that the brass industry is just awakening to its possibilities and that the modern foundryman must avail himself of every opportunity to learn if he would keep to the front. It is the realization of the facts stated above that has led some smelters to produce an ingot of exact composition so that the foundryman may have exact knowledge of the metals that he is using.

A few years ago the average foundryman relied on scrap when he used old metals. What are some of the disadvantages of scrap as ordinarily bought? From the nature of the material no guarantee can be made as to its composition, neither can one tell readily if any objectionable alloys are present. The appearance almost wholly governs the judgment of its quality. This immediately opens the way for the introduction of lower grade material into the higher grade in percentages that are largely determined by the ability of the consumer to sort properly. The selling price of scrap is generally high enough so that any lowering of its average quality means a very decided loss to the consumer. Scrap always carries a certain percentage of dirt and foreign materials which make the shrinkage in melting higher than that of ingot metal. This shrinkage is a variable quantity and makes it difficult again to determine the value of the scrap. We can easily see therefore, that in the matter of composition and of shrinkage, the ingot presents a decided advantage. In some cities the consumption of scrap has fallen off very noticeably within the past two years, its place having been filled by ingot brass. The apparent saving in ingot is not as great as in scrap, but the actual saving is more. The high price of copper during the years 1903 to 1907 tended to a lowering of the quality of all brass. Scrap reflects this condition so that its present average value is often less than that estimated. The value of a guaranteed ingot is never uncertain on that account.

The description of the manufacture of high grade ingot brass makes it evident that a higher price must be asked for it than for the old style ingot or for scrap brass. A careful analysis of the situation, however, reveals the fact that the difference in price is more apparent than real and should not be construed as an arbitrary increase on the smelter's part, for he generally gives more nearly value received than the scrap dealer. The foundryman must learn, however, to distinguish between the different ingot makers and select the one who is responsible and will stand back of his guarantee.

To summarize, let me mention the six principal points of advantage in using ingot brass. They are:

1. Uniform composition,
2. Low shrinkage in melting
3. Decreased cost in handling,
4. Exact amount of impurities known,
5. Value received for the price paid
6. Saving in first cost over new metals.

While some points have been touched on in this paper that may seem a little foreign to the subject, I have tried to keep in mind the fact that what the brass founder needs in general as well as special information, for in these days it takes both kinds to travel on the hard, high road that leads to good castings.

Standardizing Foundry Facings.

By H. F. Frohman.

In making castings, especially medium and large size, something is required to face the mold; that is by facing the mold I mean covering the pores of the sand, so that the mold will practically have a smooth surface.

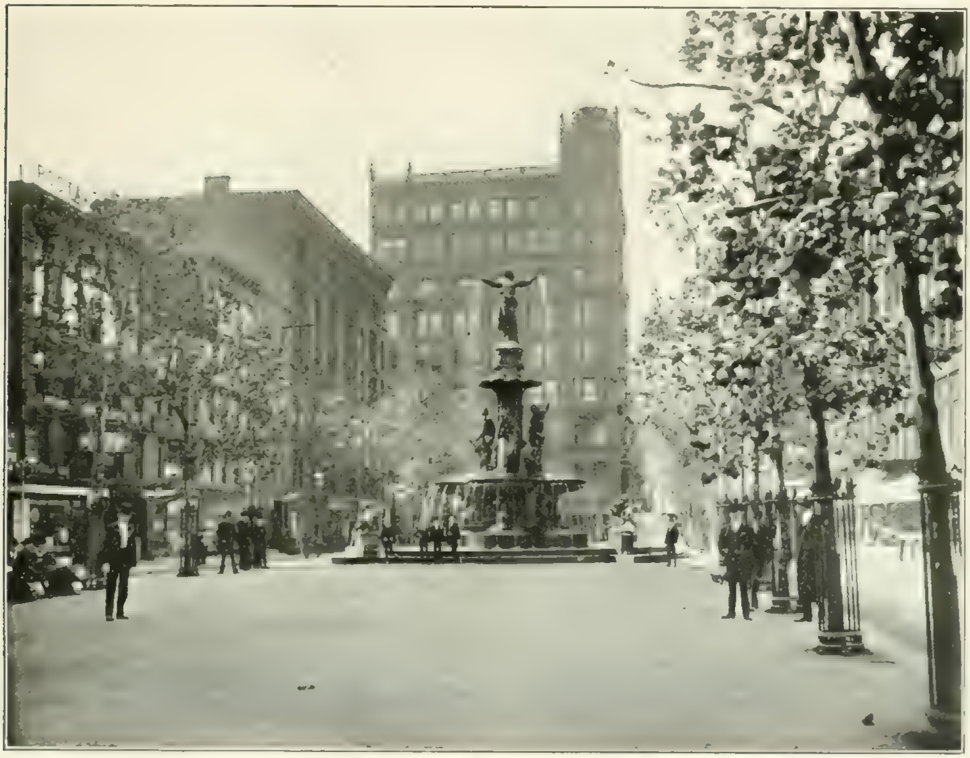

Fig. 4. The Tyler-Davidson Fountain at Fountain Square, Cincinnati. One of the Most Successful Works of Art in the United States. Designed by August Von Kreling and Cast in the Royal Bronze Foundry at Munich, Germany. Erected in 1871.

The very best article for this purpose is plumbago or graphite with a high percentage of graphitic carbon, the crystalline form from Ceylon giving the best results. This plumbago must contain a certain percentage of graphitic carbon so that when the molten iron is poured into the mold it will assist the iron to find its proper resting place and be of such a refractory nature that the iron cannot cut into the mold itself.

A good plumbago or blacking must not only have the proper chemical analysis, be of such a refractory nature to withstand the hot iron from cutting into the mold, but also be of such a nature that it will not retard the flow of the molten metal, but on the contrary, assist it to glide along.

From experience in many years past it has been found that plumbago or graphite of a high graphitic carbon (Ceylon grade being the best), is the most suitable for this purpose, not only in dry sand, but in green sand work and also for blacking cores. There is no doubt that a high grade of plumbago makes the most suitable facing or blacking for producing a bright, clean casting.

Ceylon graphite (high grade for facing purposes), should analyze about as follows:

Moisture	1.20
Oxide of iron	5.90
Aluminum	3.06
Lime	0.90
Silica	16.14
Graphitic carbon	72.80

The bulk of Ceylon graphite imported for foundry facings runs between 50 per cent. and 60 per cent. graphitic carbon. These are straight Ceylon graphites, not touched by the facing man. In the face of this fact an amusing instance may be mentioned here. We had made a shipment of straight Ceylon graphite showing 62 per cent. graphitic carbon to an eastern firm; their chemist was of the opinion that all Ceylon graphites analyzed 100 per cent. graphitic carbon. With great care he figured out to the third decimal how much of an inferior article we had added to the Ceylon plumbago, and we "got it."

Relative to coke blacking used on certain classes of work, this should analyze:

Fixed carbon	88.0
Ash	9.0
Sulphur	0.8

Anthracite blacking when used as a pipe blacking or mineral facing should show:

Moisture	7.0
Fixed carbon	84.0
Ash	9.0
Sulphur	0.5

A good grade of charcoal facing which is generally used by the foundries, not only for parting purposes but also for foundry facing, and as a core wash, should analyze:

Volatile matter	10.0
Fixed carbon	85.8
Ash	3.7

Ash varying according to the kind of wood and time of cutting.

In judging a foundry facing such as graphite, coke, anthracite, charcoal, the carbon percentage should conform as nearly as possible to the above.

Melting Brass Turnings in the Oil Furnace.

By Edward H. McVeen.

For the past twenty three years I have been melting brass, twenty years with the coke furnace, three years with the oil furnace. The three years' experience melting with the oil furnace, brass turnings from automatic machines will be the subject of this article.

The turnings are from the yellow brass stock rods made by the best mills in the country, their composition averaging about 60 per cent. copper, 36 per cent. spelter and 4 per cent. lead. From these turnings we produce light ornamental yellow brass castings and some medium heavy plain castings for turning. These castings must all be sound, clean and smooth, the accomplishment of which is quite a trick, as every foundryman knows.

We are using a stationary oil furnace that takes two No. 30 crucibles in the one chamber, using an air pressure of seven pounds and consuming three gallons of fuel oil to the hundred pounds of brass melted, with a loss of 3 per cent. in metal, crucibles averaging from twenty to twenty-five heats. Two hours' time is consumed in melting 200 pounds of metal, thirty pounds being gates and sprues, the balance turnings; the first heat from a cold furnace taking about one hour longer. This I consider fair practice with our raw material, being turnings with a low market value.

In the oil furnace we have the heat and blast under perfect control. This is of great value in feeding the furnace. Very often it is necessary to shut off the blast and oil to prevent the loss of fine particles of brass, flux or charcoal.

In bringing down a melt I put in crucibles about 10 pounds of sprues or gates, fill on top with turnings, using about 1 ounce of rock salt for flux, covering whole with about 2 inches of fine charcoal; start the blast at about 4 pounds pressure so as to bring the heat up gently, as cold furnace and crucibles will cause both to scale and possible fracture. In ten or fifteen minutes I increase the pressure and in thirty minutes I have a melting heat. From this time on the furnace requires the attention of the melter.

With the iron bar I find that the metal and charcoal are quite a solid cake, but I know that in the bottom of the crucible there is a nice puddle of metal, so now I break down this crust with the bar and force all through the liquid metal and I find I have room for about 10 pounds of turnings. These are fed into the crucible and in a few minutes the same process of breaking down and forcing through the liquid metal is performed, and so on, using a little flux and charcoal until the crucible is full.

Now the oil and air pressure are gauged so that a rich sun colored blaze fills the furnace and a green yellow cone shaped flame shoots ten or twelve inches out of the top of the furnace. In a very short time you will recognize the zinc smoke, a sure sign that your heat is coming. I am not satisfied, however, with smoke alone; I must see the color of the metal, and note its clear liquid brightness before I tap vigorously on the iron tank for my helpers to handle the heat.

At times I have a little trouble with castings being rough and porous. In this case I increase the sprues and use less turnings, and for very particular castings we use all sprues and gates or ingot metal from turnings. The melting of turnings to ingots and then remelting makes a wonderful difference in the castings produced, but is expensive.

Fig. 5. The Chesapeake and Ohio R. R. Bridge Across the Ohio River, Connecting Covington, Ky., and Cincinnati.

Waste Heat.

By F. W. Reidenbach.

As we are living in an age of invention, we are startled almost every day by some announcement of the achievements of mankind in every line of art, science and mechanics.

It has been the chief aim of the present age to accomplish at least three things, viz.:

Speed over the earth,
Speed over the water,
Speed through the air.

In the efforts of the many to bring to a successful issue these three things, inventive genius has come into contact with many heretofore unknown substances. Before being able to cope with them, at least a partial knowledge of their power must be ascertained. Of these substances we are largely indebted to gas or gases for a large number of the conveniences and comforts of mankind. When the burning of bituminous coal first brought to our notice gas, it was not long before its bright and brilliant light took the place of the tallow dip in our homes; the striking of oil gave us the fluid burner and the kerosene lamp. What a joy came into the hearts of the people for this advancement of science.

A little later came the gas engine. This has consumed the time and attention of inventive genius until we now have

Our swift speeding motor cars,
Our swift speeding motor boats, and
Our swift speeding flying machines

Had such a thing been predicted fifty years ago, the advancer of such a thought would have been incarcerated in a jail or an asylum and branded as a dangerous character to let loose upon an innocent people.

But even to-day the use of gas to illuminate has taken somewhat of a back place. We have reached the electrical age and it seems as though the highest pinnacle of illumination has been reached.

But gas, that upon which the attention of this paper is directed, has by no means become obsolete. It still has numerous uses. It is still in its infancy. It still has greater possibilities than those which have been discerned or yet dreamed of. All combustible materials have embodied within them something of a heat producing nature which during the process of combustion produces a certain amount of gas plus heat.

Now to reach the essence of what is intended in this paper. It is not a treatise of what has been accomplished, but more of a question asked as to what can be accomplished if a concert of the brain power now engaged in our foundry business can be centered upon the practical and economical advantages to be derived from the saving of this waste heat which goes off in the form of gas.

Do we as foundrymen get all the value from the combustible materials we use in melting the various metals? Or do we just melt metals? It seems to me we ought to utilize this waste heat to good advantage. Open-hearth steel mills, by the use of waste heat units, generate steam sufficient to operate large plants. Why not brass foundries? Construction of plant would, perhaps, be the first consideration. A plant would have to be constructed upon lines whereby all of the valuable points appertaining to the use of the waste heat could come in for consideration. I would suggest a core-oven as one important factor; a suitable rack for skin-drying molds would be another; or, like the steel mills, a steam plant sufficient to operate a tumbling barrel, a sprue cutter, a saw or emery wheels; or one may at least use the heat for producing hot water. That would add to the comforts of the help in washing up for supper after their daily toil.

There are a large number of foundries which are to-day using special oil-burning furnaces and forcing a tremendous amount of waste heat up through a tube to the outer roof. This waste heat could be made to do some work.

Many things can be accomplished with this subject of waste heat if proper attention be given to construction and the proper laying out of the foundry. Of course, it would work more advantageously in the larger plants, but in this present age it seems to me that there is nothing impossible.

In the presentation of this paper the writer does so with the full knowledge that waste heat is a very important factor in the larger plants. In our works we maintain a steam heating plant caring for our entire offices with the waste heat of only two No. 200 crucible furnaces at an annual saving of $300 in fuel.

A System of Distributing Waste Losses in Raw Material to the Cost of Finished Products.

By L. W. Olsen.

In the melting and mixing of non ferrous metals the losses that occur are an important factor in the cost of transformation of this class of materials, and it will be the object of this article to indicate one method by which these losses can be distributed over the cost of the finished product. It is also quite evident that the reclaimed materials are of sufficient value to be taken into consideration more in detail than is the case with the working of ordinary iron and steel.

We have two distinct phases of this loss:

First: The loss in converting the original metals, whether in the form of prime metals, gates, sprues or scrap purchased outside, into castings, and

Second: The loss of remelting the turnings, borings and chips from the finishing department.

In foundries furnishing castings direct to customers the first loss is the only one to be considered. When the castings are machined before they become salable articles, the second loss must also be considered. In some establishments the castings are treated as though they were sold at cost to the finishing department, but in such cases a separate cost accounting must be made of this material in connection with the subsequent handling.

We will consider first the original loss of handling in the foundry. This loss is made up of several items, such as the loss in the melting furnaces due to volatilization, oxidation and combination into fusible or impure substances; the loss in skimming; the loss in spilling of metal on the floor; the loss of metal in grinding, chipping and cleaning castings. These losses should, of course, be credited with the salvage obtained from the recovery of metal, or sale of such items as grindings, sweepings, foundry dirt washings, etc. While it is in most cases quite difficult to separate these various losses, the sum total of them can be very readily determined, accounted and reduced to a percentage of the weight of good castings produced. This accounting can easily be made continuous and results checked from time to time, and such changes made in the cost of these items as may be deemed advisable.

total cost of the original material divided by the total weight of all the castings it is possible to make from this material. Let us assume for purpose of illustration that we have 1,000 pounds of original metal in such relative amounts as will produce a certain composition in the castings, and that the cost of this original metal is $150, or 15 cents per pound. If we could melt and remelt this metal a sufficient number of times so as to transform all of it into castings except what was irretriev-

Fig. 6. The Rookwood Potteries at Cincinnati, in Eden Park. The Most Celebrated Pottery in the United States and One of the Famous Potteries of the World. Open to the Public During the Convention.

Let us assume that the resultant and final composition of the metal in the castings has been predetermined, and that the relative and specific amounts of certain original metals to produce such a resulting composition has been determined also. We are in fact only concerned with the original cost and quantity of the material and the resulting quantity. The difference is all loss, and its effect is to increase the cost per unit of weight of the resulting castings to a point where it equals the

ably lost, we would find that something less than 1,000 pounds of castings had been produced. If this were 5 per cent of the original amount, or 50 pounds, the material in the resulting 950 pounds of castings should equal the original cost, or $150. This would be .1578+ per pound.

We now come to the influence on the cost of the finished article, of the loss in remelting the metal removed in finishing, which is relatively greater than in melting original metal

In other words, the value of the borings and turnings per pound is not as much as the value of new metal of the same composition, because of the greater loss in melting this class of material. If this were not the case we could consider the borings and turnings simply as prime material to be used over again. However, the only consideration entering into this calculation is the additional loss in melting turnings, over what the regular loss of melting new metal would be and shall be referred to subsequently, as the percentage of additional loss, and it will be well to bear this distinction in mind. For a given process, and material of a specific composition, this loss as applied to any specific article varies with the amount of metal removed from the rough castings, which must at some subsequent time be remelted, and as we increase the relative amount of turnings we must increase the cost per unit of the metal remaining in the finished article to make up the loss.

From this it is evident that the increase in cost at first is very slight, but as the percentage of metal removed in finishing increases the cost increases quite rapidly. Under the conditions assumed, the increase per pound up to 18 per cent. is about the same as the increase from 18 to 30 per cent., and from 30 to 40 per cent., with the increase from 40 to 50 per cent. slightly higher. In actual practice the unit on which costs are figured is usually the complete article, whether made up of one or more parts, and it is, perhaps, only in occasional instances, if at all, that the percentage of metal removed in machining is more than 50 per cent. of the weight of the rough castings. Such instances as do occur can easily be handled individually.

In carrying the results to a practical application, we can divide all articles to be manufactured into four classifications, arranged according to whether the percentage of metal removed from the rough castings is:

From 1 to 18 per cent.,
From 18 to 30 per cent.,
From 30 to 40 per cent.,
From 40 to 50 per cent.

If we use the maximum percentage as applying to all cases in any particular class, then we assume a figure of 18 per cent. for all articles coming in the classification of from 1 to 18 per cent. for all articles coming in the classification from 18 to 30 per cent., and so on. The using of the maximum figure instead of an average figure for each class, will perhaps be a more conservative plan, but if deemed advisable an average figure can be used for each classification. The determination of this average will be considerably influenced by existing conditions, which vary in different plants.

In the practical application of this plan definite information must be obtained as to the total loss in the foundry in percentage of good castings produced, and the additional loss that is incurred in the remelting of borings and turnings over what that loss would be in case nothing but new metal is used. With this as a basis we can take the formulas for making the various compositions in use and compute the cost of each according to the value of the various amounts of prime materials entering into them. This cost should, however, be figured on the amount of the different ingredients that are put into the furnace, and not on the resultant composition. The cost of the various compositions thus obtained are then corrected to give the cost of metal in the castings, allowing for the loss of transformation as outlined in the first part of this paper.

Having determined the actual additional loss in remelting borings and turnings, the next step would be to figure out the actual net increase per pound, caused by this influence, and determine the number of classifications to be used. As stated before, this will depend on the actual net difference in cost per pound, and what degree of refinement is desired. The actual values per pound should then be computed for each of the compositions used for the rough casting condition, and for the various classifications of percentage of metal removed in finishing. To figure the cost of material in any article it is then necessary only to compute the ratio between the weight of rough castings and the amount of metal removed in finishing, to determine the proper classification in which any particular article belongs. The cost of the proper composition per pound for that particular classification of finish, multiplied by the weight of the finished article, will give the material cost for that article.

The correctness of this method will, of course, depend to a very large extent on the correctness with which the loss of transformation and the additional loss of melting borings has been determined. Aside from possible error in this respect, the result will be correct, except for a slight error, due to the fact that the losses in melting are not proportional to the amounts of the various ingredients used. For instance, the loss of zinc is relatively higher than that of copper. However, the actual error introduced because of this condition is negligible as compared with other errors that necessarily creep in in actually determining the losses.

The actual methods of accounting of material for the foundry in order to obtain continuously a check on the various losses, is really a subject by itself, and will not be treated in this article, but whatever plan is followed should be so arranged as to give, with a fair degree of accuracy, the information required.

Under a scheme of accounting where the castings are considered as sold to the finishing department, and credit given for the amount of turnings returned, this credit value should take, and probably does take, into consideration the additional loss in melting this material, over that of new metals, but this additional loss must necessarily be distributed unfairly over articles having different percentages of metal removed, unless some very elaborate scheme were devised to make a distribution according to amount of material turned off for the various articles. It is probably very evident that except in extreme cases, where the amount of metal removed is only a negligible quantity, this additional loss should be considered in order to consider costs and losses that actually exist, and which affect the final results to an appreciable amount, especially in view of the increasing competition of the present day.

An alloy of two parts of silver and one part of platinum is extremely ductile and is used in the form of wire for electrical resistance standards.

Very little type metal now finds its way into the hands of the scrap metal dealer, although in former times it was sold to him by printers, when worn out, and formed a raw material for making babbitt metal and pewter. The type foundries now purchase practically all the old type from printers, as they are able to pay a higher price for it than scrap metal dealers. It is used again for making new type.

The Wohlwill Process of Producing Pure Gold.

As a means for producing gold of a high degree of purity, the Wohlwill process is only equalled by the very laborious and time consuming chemical processes. When properly conducted it is capable of turning out gold of a fineness which, were it another substance, would be called "absolutely chemically pure;" but it usually falls short of being so by an extremely small quantity. In fact, the gold is so pure that it almost defies chemical analysis to determine the impurities and it is daily turned out with a fineness of 999.8 and higher. With careful work and the use of commercial gold for the anode, it is possible to make what to all indications is absolutely pure gold. But in practice, of course, this is impossible as the raw material in the form of impure gold used for the refining, will not admit of its being done with such perfection.

The Manner in Which the Gold Deposits on the Cathode Strip.

The Wohlwill process of producing pure gold is an electrolytic one and several patents upon it are now in force. The inventor is Emil Wohlwill of Hamburg, Germany. The process is carried on at several establishments in Germany for refining gold and it is said that practically all of the gold refining in Germany is now done by this method. In the United States, the process is used for refining the gold at the United States Mint and is operated under a license.

The principle of the process lies in the character of the solution. In other words, the patent is upon the solution of electrolyte. It is composed of a solution of chloride of gold containing a considerable quantity of free hydrochloric acid. The use of the hydrochloric acid is really the essential feature of the patent.

If a simple solution of chloride of gold is used for electrodeposition with a gold anode and cathode, free chlorine gas is evolved at the anode which will escape without action upon the metal; but if a quantity of hydrochloric acid is added, no free chlorine escapes and it acts upon the gold anode and dissolves it, supplying the solution with the necessary quantity of chloride of gold to make the operation continuous. The evolution of chlorine gas at the anode when no hydrochloric acid is present seems almost paradoxical, as it is an active solvent for gold, but it is, nevertheless, true. The action of the hydrochloric acid in preventing the escape of chlorine is equally as perplexing, but the action really takes place and forms the fundamental principle of the process.

The solution used at the Mint for refining gold by the Wohlwill process consists of the following:

Water............	........1 gallon
Gold	......3.8 oz.
Hydrochloric Acid	5 oz.

The gold is dissolved in aqua-regia and made into chloride before adding to the solution and the hydrochloric acid is the strongest commercial acid of 1.10 sp.gr.

The solution is contained in white porcelain cells holding about five gallons. The tanks rest in a box of sand heated by a steam coil so that the solution itself can be kept at a temperature of about 120 degrees F. When the solution is worked in a warm condition, less voltage is required and the quantity of free acid needed is diminished. Circulation of the solution is necessary in order to secure uniform results and this is obtained by mechanical means.

For the cathode a strip of pure gold is used and upon it the gold deposits in a spongy condition. It is allowed to deposit until it becomes too voluminous when it is removed and washed for further treatment by melting.

The voltage used is low on account of the fact that a low electromotive force only is required for depositing the gold. From 1½ to 5 volts are ordinarily employed. The anodes used are 6 in. long, 3 in. wide and ½ in. in thickness. Rolled gold about 0.01 in thickness is used for the cathode. The distance between the anode and cathode is 1½ inches.

When the electrodeposition of the gold is allowed to go on, the following reaction takes place at the anode:

The gold is dissolved and passes into the solution from which it deposits upon the cathode. The silver is converted into chloride and either remains upon the anode as a slime or diffuses through the solution as a fine sediment. It is not deposited under either condition. Copper is dissolved but does not deposit with the gold. Platinum also dissolves and is not deposited. Lead partly passes into the solution and partly remains as chloride in the slime. Iridium and other metals of the platinum group remain undissolved. Bismuth usually remains as the oxychloride in the slime, but should the free acid be such as to dissolve it, it does not deposit. Antimony passes into solution but does no harm. The other metals, such as zinc, iron, arsenic, nickel, cobalt, etc., pass into the solution but do not deposit with the gold.

After a while the solution must be fed chloride of gold to replace that offset by the impurities in the gold. If at any time, the quantity of hydrochloric acid become deficient, it is at once known by the smell of chlorine gas at the anode. It can immediately be remedied by the addition of more acid. The cost of the hydrochloric acid needed for replenishing is about 20 cents per 1,000 oz. of gold refined.

The slimes in the solution as well as the solution itself, when it becomes contaminated to such an extent that it contains too little gold in proportion to the impurities, are refined or treated for the recovery of the silver, platinum and other metals which they contain. It is a singular fact that, although the solution gradually becomes contaminated with metals such as copper, platinum, lead, bismuth, iron, etc., they do not prevent the deposition of pure gold, and the reason for abandoning it is on account of the displacement of the gold in it by the impurities so that it works too slowly. This fact is a remarkable one and serves to render the process safe under all conditions.

The gold deposited upon the sheet gold cathode is in the form of a sponge, although coherent enough to remain upon the surface. While this gold is very pure and soft it is not sold in this condition, on account of the difficulty in weighing it. It is run into bars of the usual character. All gold is now refined at the Mint by this process and its purity has proved a great boon to those who manufacture dental supplies as they are able to use it without the further refining that is necessary with ordinary gold bars. As the Mint does not sell less than $5,000 worth of fine gold at a time, it is impossible to purchase gold made by the Wolhwill process from them except in this amount or over. Less quantities will have to be obtained through dealers in bullion.

Silvering Mirrors.

Editor:

I have read with interest the article on "The Modern Method of Silvering Glass Mirrors," in THE BRASS WORLD, May, 1909, page 171. It may be of interest to your readers to know that during the past two or three years, the use of a celluloid finish to protect the back of silvered mirrors has been adopted by quite a number of mirror manufacturers.

After the mirror has been silvered, it is given a *thin* coat of shellac, cut in grain alcohol, and this is followed up and protected with a coat of "Black Zapon Enamel," which is made especially for this purpose. The enamel is made black so that the workmen can see where it is applied and be sure and not skip any point. There is one concern in the country that has been using this material in barrels for two or three years, and others are using it on a smaller scale.

It will readily be appreciated that a celluloid finish must be absolutely waterproof, and as it is chemically inactive, it makes an ideal protection for the silver.

W. A. JONES.*

Keeping Plating Solutions of Uniform Strength.

In establishments where the most careful plating is carried on, *i. e.*, in the silver plating of flat-ware, much care is exercised in maintaining the strength or density of the plating solutions, in order to become certain that uniform conditions are preserved throughout. A matter of one or two degrees on the hydrometer is as carefully corrected as any other portion of the operation.

Although this maintaining of standard strength may not appear necessary as long as the voltage remains constant, it is absolutely imperative, or the reading of the volt meter will be meaningless. Take, for example, a silver solution which has become concentrated by evaporation until it stands 20 degrees Beaume, although the intention is to have it stand 10 degrees. If one volt is used in plating, the work is usually "burnt" because of the increased conductivity of the solution at its increased strength. If it is assumed, for the sake of argument, that the conductivity of the solution at 20 degrees, is twice what it is at 10 degrees, then by Ohm's law (which always holds good) twice the amount of current passes at one volt in the 20 degree solution that does in the 10 degree one.

The result is, that although a plater may believe that because one volt only is used (and this gives good results in silver plating with a solution standing at 8 or 10 degrees) the current strength is right, while in reality, it is actually twice too strong.

A voltmeter is only of value when the solution is maintained at uniform strength, and when its readings are to be taken as the right condition in plating, it is absolutely necessary that the solution be maintained at a constant strength.

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*General Manager Celluloid Zapon Co.

Laboratory Experiment.[*]

Depositing an Alloy of Nickel and Cobalt.

Alloys are always harder than pure metals, and as it has been proposed to deposit nickel and cobalt together in order to obtain a hard coating, the subject was deemed worthy of an experiment. An alloy of nickel and cobalt is much harder than either of the constituent metals, and both are equally non-corrosive and have practically the same properties. Cobalt very closely resembles nickel, although it has a faint reddish shade. It is fully as non-corrosive as nickel, may be plated in the same manner and from its double sulphate solution, and takes equally as high a polish when buffed.

A solution was made up of the sulphates of nickel and cobalt, together with sufficient sulphate of ammonia to make double salts of each. The proportions taken were such that the nickel and cobalt existed in the ratio of about 70 parts of nickel and 30 parts of cobalt, as this seems to be about as hard as any of the mixtures of the two metals. The solution was made up with water so that it stood about 6 degrees Beaume, and it was made acid with boracic acid.

A current of about 2 volts was used in order to obtain a soft deposit, and after one hour the coating (on brass) has the appearance of ordinary nickel deposited this length of time. The solution had a reddish-green color (nickel salts are green and those of cobalt red, so that the two produce the reddish-green caste).

The deposit formed was tested qualitatively and found to contain both nickel and cobalt in, apparently, about the proportions used (70 nickel and 30 cobalt), although they were not determined quantitatively.

The nickel and cobalt deposit thus obtained was found quite hard; in fact, much harder than nickel alone. This hardness was so manifest that it was more difficult to obtain a high polish on it with rouge than in the case of nickel alone. A hard crocus was required for "coloring" the deposit.

The color of the deposit is practically that of nickel, although a slight reddish shade is noticeable. Cobalt itself has a reddish shade while nickel possesses a blue caste. The deposited alloy seems to have a shade intermediate between the two.

The deposit of nickel and cobalt will probably find few uses as a plating solution of this kind is difficult to keep in order on account of the presence of two metals, both of which give a white deposit. Its hardness, however, might fit it for certain classes of work where a very hard deposit of a non-corrosive nature is desired. It has been suggested for coating electrotypes so that a large number of impressions may be obtained from them, and in place of the electro-deposited iron frequently used for the purpose. While hard the iron rusts easily. The nickel and cobalt deposit would be free from this objection.

A New Tin Plating Solution.

A new tin plating solution has been discovered by J. C. Beneker, of the Meaker Co., of Chicago, Ill., which it is claimed gives a heavy tin deposit without the sponginess that follows when attempts are made to produce a thick deposit by the usual methods. The solution consists of the following:

Water	1	gallon.
Caustic soda	1	lb.
Sodium hyposulphite	1/2	lb.
Tin chloride	1/4	lb.

The solution is preferably used hot, although it works cold.

The method of making it is to dissolve the caustic soda in water and then add the tin chloride (stannous chloride or "tin salts"). When a clear solution has been obtained the hyposulphite of soda is added. It is claimed that even with a high current density so that a rapid deposition of tin is obtained, the tin deposits without sponginess. The process has been patented (921,943, May 18, 1909).

Whiting (also called "Paris White") is finely ground chalk. Chemically it is calcium carbonate.

The American and English gallon differ in their capacities. The American gallon contains 231 cubic inches, while the English gallon contains 277.27 cubic inches. This difference should be taken into consideration in calculations. The weight of an American gallon of water is 8.33 pounds and that of the English 10 pounds.

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[*] Experiments were carried out in the experimental laboratory of THE BRASS WORLD.

A Small, Belt-Driven Air Compressor.

The increasing use of sand-blasts, pneumatic-tools, molding machines with vibrators, lacquer sprays etc., has created a demand for a small air compressor driven by a belt so that it can be used in any establishment which is equipped with power. To meet just such requirements as this, the Westinghouse Air Brake Company at Pittsburgh, Pa., whose familiarity with art of air compression needs no comment, has placed on the market a small air compresser of the belt-driven type. It is made in both the single and double cylinder pattern. The single cylinder is herewith illustrated.

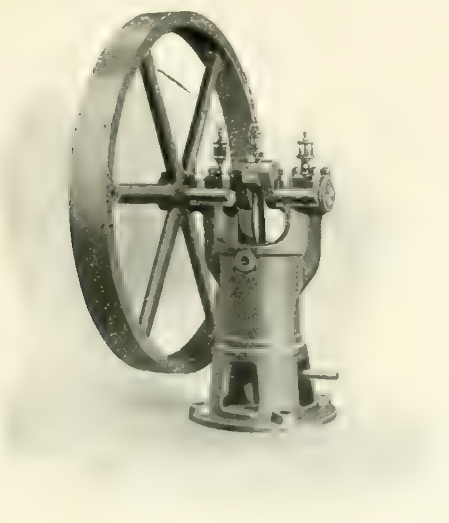


Fig. 1. View of Air Compressor.

The diameter of the air cylinder is 3 inches and the stroke 4 inches. The fly wheel attached as shown in Fig. 1 is 30 inches in diameter. The weight of the complete compressor is 218 lbs.

In Fig. 2 the cross-section of the compressor is shown. The cylinder is surrounded by a water jacket through which cold water passes, as heat is always generated when air is compressed. Is this manner the compressor is kept cold and the efficiency increased. It may be used for any pressure up to 250 lbs., and is operated, as the occasion requires, from 150 to 250 revolutions per minute. To produce a pressure of 100 lbs., per sq. in. less than ½ H. P., is required, but for 250 lbs. the speed is increased and 1¼ Horse-Power is needed. For less than 100 lbs. pressure the power required is quite small. The compressor, therefore, is adapted for practically every requirement in the compressed air line in which a large quantity of air is unnecessary.

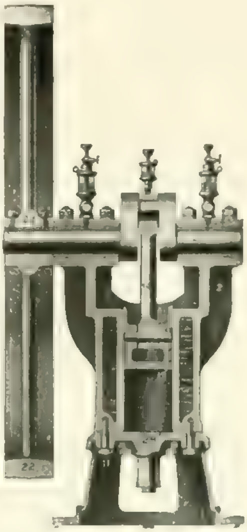


Fig. 2. Sectional-View of the Air Compressor.

A New Flux for Use in Brazing Cast Iron.

A new flux for brazing cast iron has made its appearance in France. It consists of the following:

Zinc chloride . . .	38 parts.
Fused borax	60 parts.
Potassium permanganate ..	2 parts.

The ingredients are ground together and applied to the surface slightly moist. The zinc chloride gives the necessary moisture to the mass, particularly if left exposed to the air. Ordinary brazing or silver solder is used.

The theory of the mixture lies in the use of the potassium permanganate, which serves to oxidize the carbon on the surface of the cast iron. The borax and zinc chloride act as agents for dissolving the oxide on the surface while the heating is taking place.

Leaded Glass Effects by Metal Deposition.

A process for producing leaded glass effects without destroying the uniformity of the design on the glass has recently been patented by G. H. Brabrook, of Taunton, Mass., formerly general manager of the Reed & Barton Company, of that city (U. S. Patent 921,355, May 11, 1909). The method used is as follows:

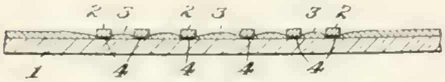


Fig. 1. Cross-Section of Glass and Deposit with Enamel.

Any desired design is painted on the glass by means of a paint composed of very finely divided silver, red lead, silica and borax (very finely ground) and mixed with oil of lavender. This paint is the well-known material used in painting the design on glass in the manufacture of silver deposit ware previous to firing. The design, after painting, is shown in Fig. 1 by 4. When this design has been painted on, the glass is placed in a kiln and heated to a temperature which will fuse the paint and cause it to adhere to the glass, but will not melt the glass. The paint is thus fused and becomes firmly attached to the glass. In Fig. 1 the glass is supposed to be represented by 1.

Fig. 2. Design Illustrating the Finished Article

Any suitable enamel is now applied to the surface of the glass between the fused paint lines. This enamel is designated by 3 and is applied in the form of a paste or powder, as may be desired, and then the whole is again heated in the kiln to melt the enamel and cause it to spread evenly over the surface. The enamel is thus made to cover the glass between the fused paint.

When the enamel has been fused, the sheet of glass, upon the surface of which is the fused paint and enamel, is placed in a plating bath and silver, copper or other desired metal is electro deposited upon it. The deposition, of course, will take place only upon the lines of the fused paint, which, when built up, has the appearance illustrated in Fig. 1 by 2.

When completed the glass has the appearance indicated in Fig. 2. The use which the inventor suggests for this class of work is in the manufacture of lamp shades.

A New Method of Recovering Tin from Scrap.

A new and simple method for recovering tin from tin plate scrap, tin cans, etc., has been patented by Julius Elkes, of Mount Pleasant, Pa. It consists of treating the scrap with yellow ammonium sulphide. The scrap is immersed in a tank containing water then some ammonium sulphide is added and the whole heated until the tin is removed. The tin dissolves in the solution and the bare iron is left.

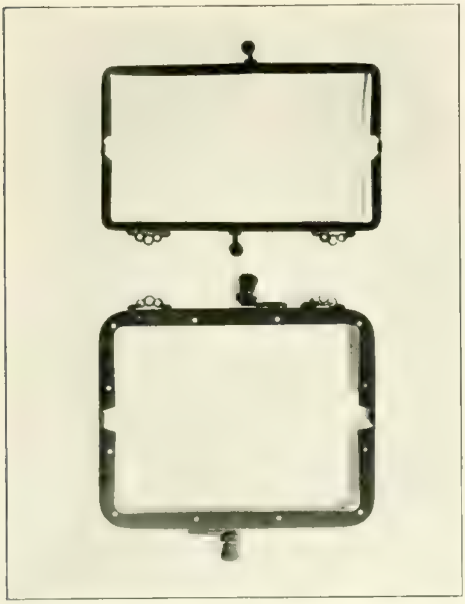
The tin is recovered by adding hydrochloric acid to the solution after it has become inactive, which precipitates it as sulphide mixed with more or less sulphur. At the same time ammonium chloride is formed (sal-ammoniac). The solution is filtered and the sal-ammoniac recovered by evaporation. When the acid is added to the solution hydrogen sulphide gas is given off, which is passed in to ammonia water and fresh ammonium sulphide is formed.

The sulphide of tin is roasted, after having been dried, and oxide of tin is formed which may be sold or the tin recovered by smelting.

In a prize essay on the occurrence and extraction of platinum in the Ural Mountains W. Geibel, in *Zeit. F. Electrochemie*, states that while in 1870 the deposits averaged 5 oz. of platinum per ton, they now run less than 1 pennyweight, but that improved methods allow the working at a profit. He says it is still estimated that at least ten per cent. of the total platinum found is stolen.

Oxidizing Silver for Producing the Gun-Metal Finish.

While the genuine gun-metal finish is done upon iron or steel, an excellent imitation and one very extensively used is the oxidized finish produced on silver by means of liver of sulphur. A large variety of articles are daily manufactured and sold with such a finish, and as it can be applied to any metal: brass, copper, bronze or the soft metals, it is a useful one, and also is quite durable.



Pocket-Book and Bag Frames. Some of the Articles Upon Which the Imitation Gun-Metal Finish is Frequently Used.

The advantage of using silver rather than copper for oxidizing with liver of sulphur is that the color is better and adheres to the silver more tenaciously. This latter property is of much advantage as it allows scratch-brushing to be carried out without danger of stripping the black deposit.

If the article is of sterling silver, the oxidizing may be done without plating, but other metals require a silver deposit. If a good finish is desired without danger of removing the silver during the oxidizing, then a fairly heavy silver deposit must be given the article. From one-half an hour to one hour is usually necessary to obtain the desired thickness of silver. The regular silver solution is employed and should *not* be the bright silver solution containing bi-sulphide of carbon as this does not oxidize as satisfactorily as the regular deposit. The silver is put on "soft" or with a weak current (about 1 volt) and should come out white and uniformly dead. A good solution consists of 3 oz. of chloride of silver dissolved in just enough cyanide solution to take it up. Then add more water to make up to 1 gallon, and 3 oz. of cyanide are then dissolved in it to give the necessary quantity of free cyanide. The solution is then ready for use.

The silver deposit is scratch-brushed in the usual manner by means of a fine brass scratch-brush wet with bran water or similar material, and is then ready for oxidizing.

For oxidizing the silver, liver of sulphur is used. The addition of ammonia to it, as practiced in oxidizing silver for French-gray work, is not recommended as it renders the deposit soft and apt to be removed in scratch-brushing. The object is to obtain as strongly adherent deposit as possible, and this can be accomplished by the use of the liver of sulphur alone. The following proportions of liver of sulphur and water are recommended:

Water	1 gallon
Liver of Sulphur	3 oz.

As silver is not readily attacked in the cold, it is necessary to heat the solution before immersion of the article to be oxidized. The hotter it is the more rapid the oxidizing, but in ordinary work, where the liver of sulphur solution is contained in a stone tank heated by hot water it is difficult to obtain a temperature much greater than 120 to 130 degrees F. This temperature, however, answers well.

When the solution is in the right condition, the silver will not become black immediately when immersed in it, but passes through a brown stage and finally becomes dead black. When this has taken place, the article is removed, rinsed in cold water, then in hot water and dried in sawdust. Careful rinsing should be done as it prevents spotting after the work has been finished.

The silver now presents a uniform, black color, but dead. In order to bring out the lustre, it is necessary to scratch brush it. This must be done dry and with a soft brass scratch-brush revolving rather slowly. The lustre of the oxidized surface is then brought out to its best advantage. A [illegible] for the purpose is now put on the article and it is completed. The lacquer used should be of a grade made expressly for the purpose as much better results are obtained with it than with one not so adapted. The manufacturers of lacquer make lacquer particularly for such a purpose. It protects the surface, and at the same time does not destroy the color or lustre.

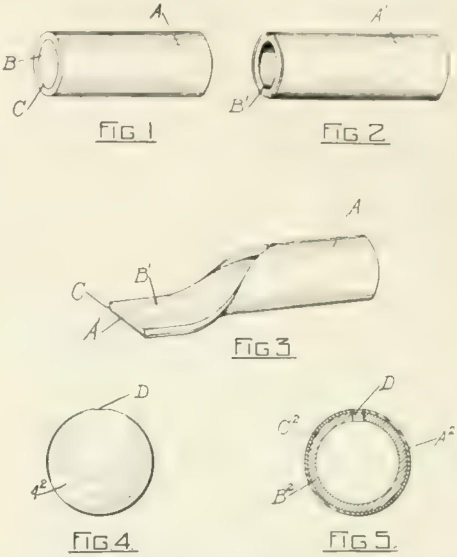
The black color on the silver is, of course, not an oxide, although usually called an "oxidize." It is the sulphide of silver. It is extensively used on purse and bag frames, buckles, hat-pins, mourning jewelry, comb ornaments, mesh-bags, and many other lines of goods where a better and more durable color is desired than it is possible to obtain with oxidized copper. The oxidized silver finish, when well done, very closely resembles the genuine gun metal.

In oxidizing metals by means of liver of sulphur, there is one feature which must be carefully looked after and that is the cleanliness of the silver before oxidizing in the solution. Grease is equally as injurious on the work to be oxidized as it is on that to be plated. Unless clean, the scratch-brush is apt to cut through and expose the silver. Cleanliness is as essential as any other part of the oxidizing operation.

A Method of Making Thin Walled Gold or Silver Articles.

A novel method of making thin walled articles of gold or silver has been invented and patented by George U. Meyer, of Providence, R. I. (U. S. Patent 921,722, May 18, 1909). The method used consists in soldering the gold or silver shell, previously formed, to a core of soft steel and then drawing or otherwise working the whole into the desired shape. After this has been done the article is treated with dilute muriatic acid, which dissolves out the steel and leaves the gold or silver intact, and in the desired condition as regards thinness.

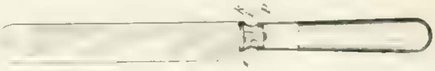
In the illustrations the sketch in Fig. 1 shows the manner of making in case a rod is to be drawn down. The steel core B is joined to the gold or silver shell A by the solder C, after which the whole is drawn down through dies as desired. In Fig. 2 the method of making a tube is shown, while in Figs. 4 and 5 the process of producing a ball is illustrated. It is stated by the inventor that, contrary to the usual belief, the gold or silver shell may be readily joined to the soft steel core by means of a suitable solder.



Sketches Illustrating the Method of Making the Gold or Silver Objects.

A New Method of Fastening Steel Blades to Hollow Handles.

A new method of fastening steel blades to hollow knife handles has recently been patented by Herman Kruger, of Holzen, Germany. The method used, it is claimed, serves to secure the handle and blade in a manner not heretofore accomplished.



The steel blade is left with the usual tang *e* and tapering as shown. It is then forced by strong pressure into two elliptical shaped blanks *p* and *k*. The blade is then inserted in the handle and the groove *i* formed around it so as to hold the blanks securely. Tests have shown that the blade resists an axial tension of from 600 to 800 pounds without breaking apart. If desired some solder may be run into the joint, but this is unnecessary except for filling the joint in order to render it water tight.

A So-Called Non-Corrosive Soldering Flux.

The soldering flux in general use consists of a solution of chloride of zinc in water. The stronger it is, the better it eats and for this reason it is usually customary to make it by dissolving in strong muriatic acid all the metallic zinc it will take up. In this manner a concentrated solution of chloride of zinc is made.

Even when made in this manner, however, it contains some free acid which causes it to corrode metals that are soldered with it. For some time past various so-called "non-corrosive" soldering fluxes have been sold and which, although not entirely without action upon metals to be soldered, are much superior to ordinary chloride of zinc in this respect. A simple method of making a salt of this kind is as follows:

Dissolve in strong muriatic acid all of the metallic zinc it will take up. Then add liquid ammonia to it (when cool) and stir until a permanent precipitate is produced that will not dissolve on stirring. Then add [illegible] of sal ammoniac to every gallon of the solution. If necessary, water may be added to dissolve the whole if it is too concentrated to take up the sal ammoniac. In this manner a neutral soldering flux is produced containing sal ammoniac which greatly aids it.

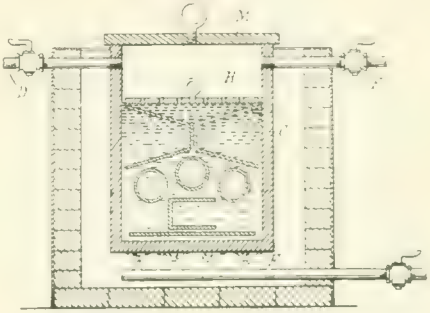
A flux is now produced that is the same as the well-known "Yagers Soldering-Salt," patented in 1873, but upon which the patent has long since expired, although now sold. Yager, however, made the salt in a different manner, although the same result was produced. The chloride of zinc produced by dissolving the zinc in muriatic acid was evaporated with the sal ammoniac to drive off the excess of acid. To every [illegible] lbs. of the solution of chloride of zinc, he added [illegible] lbs. of sal ammoniac and then evaporated by stirring until granular. The solution previously given after the addition of the ammonia and sal ammoniac may also be evaporated to dryness if desired and a solid flux obtained in a granular condition which need only to be dissolved in water for use.

The peeling of lacquers is generally caused by a slight film of grease or oil left on the metal. Surfaces should be as clean for lacquering as for plating.

The Vacuum Process for Rendering Wood Acid and Alkali Proof.

A process for rendering wood or similar material water, acid or alkali proof has been patented by Frank H. Roberts, of Lockport, N. Y. (U. S. Patent [illegible]) and which has a direct bearing upon the treatment of wood for use in plating and pickling tanks.

The method used is to immerse the article to be treated in an iron tank in which the substance used for impregnating is me'ted. A vacuum is then produced and the air and moisture are exhausted from the pores of the wood. After a time the vacuum is released and air again enters the tank. A pressure is then produced which forces the liquid into the pores of the wood left vacant by the exhaustion of the air and moisture. The details of the process are as follows:



Tank Used for Impregnating the Wood.

A cast iron or steel tank C is [illegible] in brickwork in order to retain the heat. The heat is produced by a gas burner E or other suitable means. An exhaust pipe F connects with a pump capable of producing a vacuum or a partial one (a complete vacuum is not necessary) while another pipe D is connected with a pressure pump. The substance to be used for impregnating the wood, such as [illegible], is melted in the tank and the articles to be treated are then immersed in it and held there by holding them under the surface by a perforated iron cover H. A tightly fitting cover M closes the tank when [illegible] used so that no air can enter when the vacuum is [illegible] or pressure [illegible].

The [illegible]

character of the substance used for impregnating, but it need not be high as it melts at a lower temperature in a vacuum. After it has melted, the articles are immersed and a vacuum created. This is allowed to remain for some time so as to exhaust the air and moisture in the pores of the wood, when it is relieved and pressure applied which serves to force the asphalt or other impregnating material into the pores of the wood.

In this manner, the inventor says, it is possible to impregnate wood completely so that it becomes equally as resistant as the impregnating material itself. It will be appreciated that the feature of the process lies in the use of a vacuum at first to remove the air and moisture from the pores of the wood, after which pressure is applied to force the molten material into the space left vacant.

In connection with the process, it is stated by the inventor that asphalt has too high a melting point to be used successfully alone for treating wood, but when mixed with rosin, pitch, or paraffine, the melting point is lowered sufficiently to allow successful treatment.

New Books.

ALLOYS AND THEIR INDUSTRIAL APPLICATION, by Edward F. Law. 269 pages, 54 illustrations and 42 plates of photomicrographs. *J. B. Lippincott & Co.* Price, $5.00, postage paid.

An enormous amount of research work has been carried on during the past few years to determine the nature and physical properties of alloys. To make this valuable information commercial useful, Edward F. Law has just completed his work: "Alloys and Their Industrial Application."

Mr. Law was the assistant of the late Sir W. C. Roberts-Austen, who at the time of his death was engaged upon a book covering this field. The object of the author was first, to summarize the existing state of our knowledge of mixed metals, paying special attention to the general principles and essential facts, omitting unimportant details; and secondly, to apply that knowledge to industrial alloys in every-day use. The volume is planned primarily for the student, the manufacturer and the engineer.

An Improvement in Making Screen Plates.

An improvement in making screen plates has been brought out and patented by Edward J. Welch and Adams Crocker, of the Union Screen Plate Co., of Fitchburg, Mass.

Screen plates are used in the manufacture of paper to screen the pulp to a standard size and remove lumps and other foreign matter. The plate is flat and a large number of slots are cut in the surface. These slots are tapering and terminate to a very narrow opening on one side. The slots are cut by a thin, circular saw, and in order to cut them rapidly so that the cost of making a plate will not be excessive, the metal mixture in the plate must contain considerable lead. Unless it does, the speed of the saws must be lessened, which means, of course, a less output of finished plates; then, too, the saws frequently break. When the right amount of lead is used in the mixture, however, the metal cuts freely and the saws may be run at a maximum speed.

Owing to the fact that it is impossible to roll a screen plate containing the necessary amount of lead, it has always been customary to cast them in sand. The surface is then plated off and the slots cut in. While plates of this nature give all that is desired as far as ease of machining is concerned, the metal is "dead" and does not give the wear that is desirable in the manufacture of paper or pulp. Messrs. Welch and Crocker have modified the manufacture of the screen plates in the following manner:

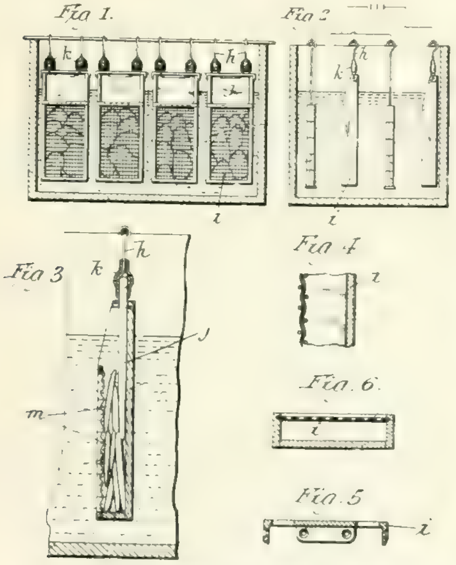
A plate is cast in sand in the usual manner and then the surfaces are machined off as usual. It is now given a light pass through cold rolls in order to harden the surface. Not enough "pinch" is taken, however, to reduce the thickness of the plate to any extent, but only to harden it. In this manner the plate becomes hard and tenacious. The slots are then cut in as usual and the plate is completed. The mixture recommended by the inventors (not embodied in the patent) is as follows:

Copper	82 per cent.
Tin	12 per cent
Lead	3 per cent.
Zinc	3 per cent.

If the plate is rolled before the surface has been machined off, the unevenness that always results when metal is cast in sand causes strains which fracture it. The plate, after machining, is of uniform thickness, and is left a trifle thicker than the finished size, so that the slight cold rolling given it brings it down to the desired size. The essential feature, therefore, is in the use of a slight cold-rolling so as to harden the plate, but not fracture it as would be the case if a greater "pinch" were taken in this operation.

A Method of Using Old Nickel Anodes.

A method of using the pieces of old nickel anodes which break off when the anode becomes old has been patented by Benjamin W. Gilchrist and George L. Rice, of Woodhaven, N. Y. (U. S. Patent 922,470, May 25, 1909). The intention is to carry the saving of nickel to the utmost degree.

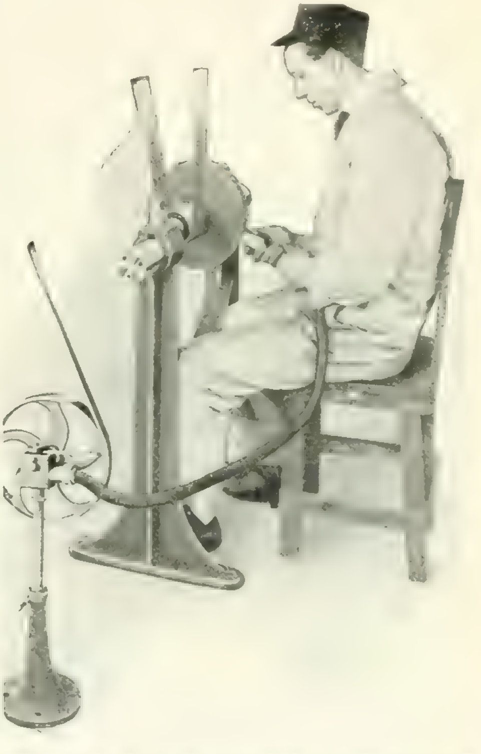


Method of Using Old Nickel Anodes.

A box *i* is used to hold the pieces of nickel anodes *m*. Through the top of the box the regular nickel anode *j* passes and comes in contact with the pieces, thus forming a connection. The copper hooks *h* are insulated by rubber *k* to prevent the solution in the tank from coming in contact with them. The front of the box used for holding the anodes is closed by perforated rubber, celluloid or similar material, and the box itself may be made of similar substances.

A Unique Apparatus for Polishing Screws.

The secret of properly polishing screws is to revolve them slowly and evenly while the head is pressed against the polishing wheel. This is difficult to do without a special appliance. The Coates Clipper Mfg. Co., of Worcester, Mass., have designed a new form of screw polishing apparatus which is capable of producing the finest results in polishing the heads of screws, bolts, studs or similar objects.



The Method of Polishing Screws by Means of the Flexible Shaft.

The apparatus is herewith shown and consists of an ordinary form of polishing wheel for carrying out the polishing. The screw is held in the end of a light flexible shaft running at about [illegible] turns per minute. The screw is held in the end of the shaft by a pair of "grab-dogs" so that it is unnecessary to stop it while taking out a screw or putting one in. By giving the sleeve a quarter turn it disengages the "grab-dogs" and locks the head [illegible] the screw can be readily removed. By turning it in the opposite direction the "grab [illegible] are re-engaged and the screw begins to revolve at once. The apparatus is now in use in many establishments making [illegible] [illegible] and similar classes of goods.

Imitation Metallized Roses.

The success that has followed the manufacture of metallized roses and rose buds for use as hat pins, has resulted in similar articles being placed on the market made from sheet metal to resemble the real article. An article of this description* is herewith shown. It is made of thin sheet brass cut out by dies and formed in the shape of leaves. The pin is soldered on, and then the whole plated with a rose gold or similar finish. The highlights are left bright and the background dead. The outside of the leaves is left by the dies in a matt condition resembling a sand blast finish.

Imitation Metallized Rose.

Drying Japanese Lacquer at a High Temperature.

Peculiar lacquers of vegetable nature are used in Japan. They are, perhaps, more varnish than lacquer, although generally called by the latter name. K. [illegible], of the University of Tokio, has made some experiments upon a variety of Japanese lacquer and makes the following comments:

"A layer of unfinished or [illegible] the lacquer hardens within 5 hours at 212 degrees F., within 30 minutes at 300 degrees F. and in 10 minutes at 350 degrees F. This method of drying at a high temperature is used in lacquering metal work, glass, porcelain, paper mache, etc., and yields a more durable layer than that obtained by the usual method of drying at the ordinary temperature. In practice, the best results are obtained by thinning the lacquer with turpentine or other solvent.

"As the layer turns brown at a high temperature, lacquers of light color should be dried at 250 to 300 degrees F., and even in the case of dark lacquers, the temperature ought not to exceed 350 degrees. Since the lacquer blackens most pigments, only a limited number of colored preparations are available. Of white pigments barium sulphate and bismuth oxychloride are used, the former being preferable when the drying is to be done at a high temperature. In any case, the final color is grayish or yellowish white.

"Red lacquers are prepared with vermilion and red oxide of iron; blue with Prussian blue; yellow with cadmium sulphide, lead chromate and orpiment; green with chromium oxide, and black with lampblack or (to obtain a more brilliant layer) with iron powder or some compound of iron. A golden coating is obtained by lacquering the article with a mixture of 10 parts of finished lacquer, 1 to 3 parts of gamboge, and 5 parts of solvent, and drying it for about 2 hours in an air oven at 250 degrees F. Several organic lakes may be used in colored lacquers, but they are decomposed when heated, and do not yield the proper colors when the coating is dried at a higher temperature."

The most adhesive material is fish glue and is used for making the best quality of gummed labels, etc. It is superior to dextrine used on postage stamps and similar articles.

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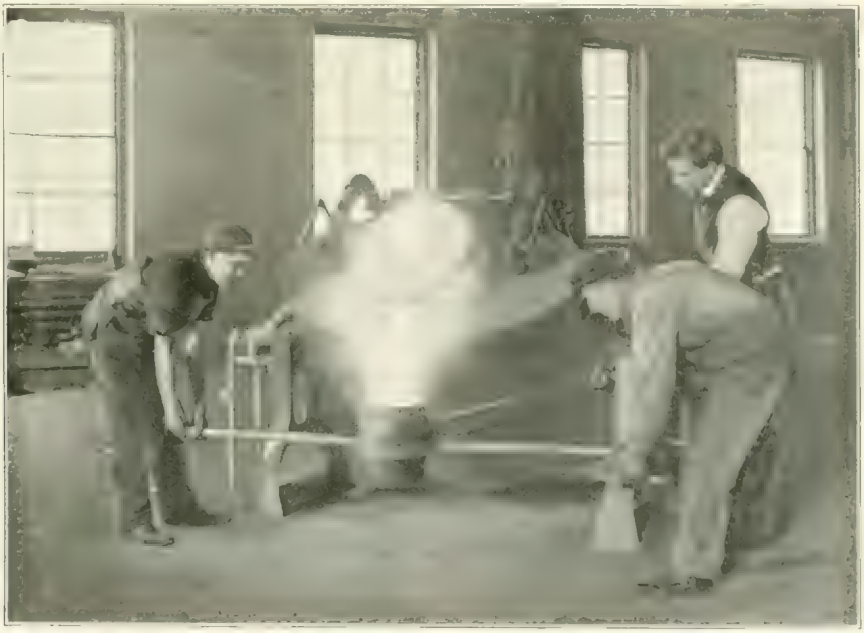
*[illegible]

The New Rockwell Double Chamber Crucible Furnace.

The new double chamber crucible melting furnace recently placed on the market by the W. S. Rockwell Company, 50 Church St., New York City, is intended for use in melting heavy charges of brass or bronze, and also the high melting metals such as nickel, steel, and similar high melting materials.

In the single chamber furnace, where the crucible and weight of charge are comparatively small, the flame laps well around the sides and the melting takes place rapidly; but in melting large charges, the mass of cold metal absorbs the heat so rapidly upon the initial melting that the time is unnecessarily prolonged. To overcome this difficulty the company designed their double chamber furnace herewith shown.



The New "Rockwell" Double Chamber Crucible Furnace. Illustrating the Manner of Pouring.

The construction is practicall [illegible]

[illegible] nance of the charge in a pasty condition. The furnace is herewith illustrated while being poured.

Recovering Silver from an Acid Stripping Solution.

In stripping silver from old spoons, [illegible] work that has been plated and smaller kinds of silver plated goods, the base metal of which is brass, copper or German silver, it is customary to use the so-called acid stripping solution. This consists of two gallons of oil of vitriol and one gallon of aqua-fortis if it is to be used cold. If used hot, then the oil of vitriol is heated and pinches of saltpetre added to it. The hot solution works rapidly and may be hastened by adding more saltpetre, [illegible] appreciably attacki[illegible]

[illegible]

is not a difficult operation. The following method is pursued:

For every gallon of the stripping solution take 5 gallons of water. Use a large stone crock for the purpose. Pour the stripping solution *into* the water. The water *must not* be poured into the acid or a violent reaction will be set up by the fact that the water is lighter than the acid, so that a layer is formed on top, heat is generated and the whole is finally thrown out. The result, therefore, if carried on in this manner is dangerous.

Pour the water into the large stone crock and then pour the stripping solution into it, little by little, stirring all the time with a stick of wood. The whole will gradually become hot and should not be allowed to become so hot as to break the crock. If the heat becomes too great, allow the solution to cool down. It is well on this account to allow plenty of time for the operation. When all the acid has been added to the water, allow to cool down so that it is at about the temperature of the room, and it is then ready for precipitation of the silver as chloride.

Now dissolve in water all the common salt it will take up so as to make it as strong as possible. The salt should not be added to the acid solution dry, but in the form of a solution in water as the precipitation is then better.

Add the salt solution to the acid solution in the stone crock little by little and with stirring. The silver will be thrown down as chloride. Stir violently to coagulate the chloride and allow to settle and add some more salt solution to the clear liquid on top. If no further precipitate is produced, all the silver has been precipitated; but if it has not all been thrown down, more salt solution is added until this has been done. Now stir for a while to further coagulate the chloride of silver. If this is not done, it will not settle well.

When the chloride of silver has settled, the clear solution over it is siphoned off with a rubber tube, and fresh water poured in to fill the crock. The whole is stirred again and allowed to settle. The clear liquid is siphoned off as before and the addition of water again made. This is repeated five times so that the majority of the acid is removed. If hot water can be used it is better.

The crock is again filled with water and the whole stirred and poured on to a filter. A large glass funnel with filter paper in it is preferable. Several thicknesses may be necessary, if the funnel is very large, in order to prevent breaking it by the weight of the solution. A cloth filter may also be used, but the paper is better. The water is allowed to run off and the chloride of silver washed several times with fresh water, preferably warm, and when the last portions have drained off, the chloride of silver is ready for reduction to the metallic condition. If desired, the chloride may be used for making up a silver plating solution without reducing it to the metallic condition.

To reduce the chloride of silver to the metallic condition, it is placed in a porcelain dish or stone crock and covered with a mixture of equal parts of muriatic acid and water. In it, in direct contact with the chloride of silver, pieces of sheet zinc are placed. The more zinc that is placed in it, the more rapidly is the silver is reduced. Hydrogen gas is given off and the chloride of silver is reduced to the metallic state. From time to time the whole should be stirred in order to expose fresh surface to the zinc.

After a few hours it is probable that all of the silver will have been reduced to the metallic condition; but if at any time the action of the acid is slow, a fresh mixture of muriatic acid and water should be added. When all the silver has been reduced, it has a gray and granular appearance and settles readily. The point is easy to determine after a little experience and the acid and zinc cannot act too long so it is well to give it ample time.

When all the silver has been reduced, remove all the pieces of zinc, and then siphon off the clear solution above it. Add water (preferably hot), stir and allow to settle. Then again siphon off the clear liquid above the silver. Repeat this five times and then filter out the silver as the chloride was done, and wash with water. This should be done as many as ten times with clean water, allowing the water to run off completely before the fresh amount is added. The washing really should be continued until the liquid which runs off from the silver shows only a very faint turbidity when nitrate of silver solution is added to it in a test tube.

The silver is now dried, and if desired in the solid condition, it will have to be melted. Use a graphite crucible and place the silver in the bottom of it. Do not fill more than half full. Cover it with borax and melt in any suitable manner. A gas furnace is generally used for small quantities, although any suitable furnace may be used. The borax causes the particles of silver to unite and a fluid melt is obtained which may be poured out into any desired shape of mold, or into water to granulate it.

If the operations have been well conducted, and the chloride of silver and metallic silver *thoroughly* washed, the silver produced after melting will be practically chemically pure, and suitable for all operations in which pure silver is used.

A New Flux for Use in Welding Aluminum.

While it is possible to weld aluminum by means of the oxy-acetylene blowpipe, more or less difficulty has been experienced by the oxidation of the aluminum while the welding is going on. The welding, of course, is nothing but a melting operation and while exposed to the aluminum oxidizes so that a flux is quite necessary for the success of the process.

A new flux for this purpose has recently been patented by Max U. Schoop, of Bois Colombes, France (U. S. Patent 922,523, May 25, 1909). The flux is composed of the following ingredients:

Potassium chloride	60 parts.
Sodium chloride	12 parts.
Potassium bi-sulphate	4 parts.
Lithium chloride	20 parts.

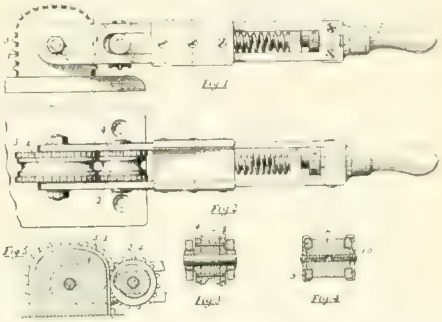
The ingredients are melted together and then pulverized for use. The theory of the flux seems to lie in the fact that a mixture of the salts melts at a lower temperature than the constituents. The use of lithium chloride, however, will add much to the expense of the flux.

A few per cent. of tin or antimony in lead pipe will render it more non-corrosive than that made from pure lead.

One of the most frequent sources of trouble in a brass foundry when special mixtures are to be made up, is the absence of suitable scales for weighing small quantities of metals in an accurate manner.

A Simple Tube Bending Machine

A simple form of tube bender has recently been invented and patented by I. S. Dement, of Chicago, Ill., and assigned to J. W. York & Son, of Grand Rapids, Mich., the well-known makers of band instruments. The tube is bent by two grooved rollers shown in Fig. 2, the grooves of which are made of the diameter of the tube to be bent. These are operated by a lever, 16, in which there is a spring used to force one roll against the other. This spring may be adjusted in tension to suit the requirements. The gears 3 and 4 serve to produce the desired shape, and by changing the contour of the large gear, 3, any reasonable angle of bend may be formed.



A Simple Tube Bending Device.

A bronze plating solution containing copper and zinc is easier to work than one made up of copper and tin and is generally used for bronze plating.

Japan wax is the cheapest wax known to commerce and is obtained from a Japanese tree. It is used for adulterating beeswax, making candles, in the manufacture of furniture polish and in making matches.

A new composition for hermetically sealing bottles, cans and making tight joints on other articles has been patented. It consists of water, 1,000 parts; phosphate of soda, 100 parts; casein, 200 parts; fluoride of ammonia, 10 parts; and glycerine, 15 parts. The whole is heated to 65 degrees C. It is used hot and spread on the joint and after cooling it is dipped into a 10 per cent. solution of formaldehyde.

Questions and Answers.

QUESTION NO. 644. Can as fine a surface be obtained on castings made in French molding sand as that produced in casting in plaster of Paris molds? I have been told by certain manufacturers that it can, but I have never been able to do it, nor have I ever seen it done. Possibly there is some method of doing it. Can you give me any information about it as I make small cast emblems for the manufacturing jewelers' trade.

Answer. Even when French-sand molds are very carefully made and the surface smoked, it is impossible to obtain as smooth a casting as can be made in plaster of Paris. Plaster gives castings almost as smooth as die work. French-sand molds are more or less open grained, otherwise they could not be used, and this makes the surface of the castings a trifle rough. A good molder, however, will produce castings in French-sand with a remarkably smooth surface and by performing a very slight amount of polishing on them, they will compare very favorably with plaster work. The cost of making castings in French-sand is so much less than that of plaster, that it has very much in its favor, and for the majority of fine work it is perfectly satisfactory. In fact, there are very few instances in which it will not answer.

QUESTION NO. 645. In making plated wire table mats from tinned steel wire, we first brass plate them with a heavy deposit and then run them through a bright dip. After the mats have been lacquered for a while and allowed to stand, they turn dark green. Our solution works all right on polished work, although the deposit is slightly cloudy but the polishing brings out the lustre all right. Why should the mats turn green in a short time after lacquering? Is it the fault of the lacquer?

Answer. We believe from your description that your difficulty lies in not thoroughly rinsing the mats after dipping. The slight amount of acid remaining in the joints of the wire mat, causes the green discoloration by acting upon the metal when the lacquer is drying. While a lacquer with acid in it will cause brass work to turn green, lacquer makers now are very careful in producing lacquer that will be free from it; and it is rarely that there is now any complaint heard among lacquer users of the once prevalent "green-drip." We advocate a thorough rinsing in *clean* cold and hot waters after dipping, and your trouble will undoubtedly cease.

QUESTION NO. 646. What can be done to keep aluminum castings from cracking while being polished? We make small, thin castings of a mixture of 2 parts of aluminum and 1 part of zinc, and when they are polished, many of them crack. They do not all crack in the same place.

Answer. We doubt very much that the polishing is the cause of the cracking. Unless great pressure is used in buffing on the wheel, we are unable to understand how it could happen. It is quite likely that the castings were cracked before they were polished as the aluminum and zinc mixtures are quite apt to crack in the mold. In many instances, such cracks are almost or quite invisible to the naked eye, but when a slight pressure is put upon the casting they become larger and may readily be seen.

QUESTION NO. 647. We wish to inquire if there is a method of finishing small brass castings, such as the strap fasteners used on automobile tops etc. We have tried tumbling them with steel balls, and while this leaves the surface nice and bright, it does not take off the roughness. The castings are bright but not smooth. We cannot afford to cut them down by hand and then buff them as the cost is prohibitive on such small work. Is there any method for tumbling them that will take off the roughness?

Answer. You would not expect to obtain a good, marketable surface on a brass casting by buffing it without first cutting it down. The tumbling with steel balls is similar to buffing, and the reason that your castings are bright but not smooth is that they are not cut down before tumbling with the balls. If you do not obtain a surface on metal before buffing, you cannot obtain a good finish on it. We suggest tumbling your castings with sand to produce a surface and remove the roughness, then with pumice to remove the scratches of the sand, and afterwards you can tumble with the steel balls as you will have a surface to work on. If the castings are not very rough it is possible that one rolling with the pumice will do. The sand rolling as well as that of the pumice is done wet. The difficulty, however, in tumbling the castings is that the edges are rounded which injures them for some classes of work. You will have to decide about this point yourself.

QUESTION NO. 648. Is sugar of lead a good brightener for a cyanide copper solution?

Answer. Acetate of lead (sugar of lead) is used as a brightener for cyanide copper solutions and while it gives good results, it is apt to produce a white or gray deposit on the anodes which does not readily dissolve. It is not extensively used and there seems to be a diversity of opinions about its value.

QUESTION NO. 649. We should like to have you recommend a mixture for use in making valves and cocks, as well as other parts, to be used on and in tin gas meters. Artificial gas companies seldom have more than 3 inches water pressure. Natural gas companies, except in the case of accident, rarely have over

8 oz. mercury pressure. The meters themselves are made to stand 10 lbs. mercury pressure, and the brass parts must likewise stand this amount. We have been using red metal known as "composition" for the parts, but it seems to us that a cheaper mixture might be employed. The castings are all finished on turret lathes and on some, box cutting and hollow mill tools are used. It is important, therefore, that the mixture should work easily.

Answer. We recommend a good yellow brass mixture as it will stand the pressure you have without difficulty. Yellow brass is now used extensively for plumbers' brass goods and water pressure used at the present time is much greater than that which your meters have to stand. The following yellow brass mixture is a good one for your work:

Copper	70 lbs.
Spelter	25 lbs.
Lead	3 lbs.
Tin	1 lb.

The tin is necessary in the mixture to render it hard and stiff. Otherwise it would be rather too soft and apt to bend when a casting is machined. The lead will render the metal sufficiently free cutting to work well with your automatic tools.

Question No. 650. Some little time ago we saw an article explaining a method or advisability of having air pressure circulation in nickel solutions. Will you inform us whether it is advisable to circulate all nickel solutions, or is the method suitable only for special work?

Answer. While nickel can be deposited more rapidly in a solution that is agitated, there is practically nothing to be gained except speed of deposition, and for the majority of purposes it is usually considered that it does not pay. In agitating a nickel solution, it must be taken into consideration that the sediment in the bottom of the tank is constantly stirred up and settles on the work. In order to prevent this, the solution needs frequent filtering. Where a heavy nickel deposit is needed in the shortest possible time, an agitated solution is necessary, but for ordinary work a still one answers all requirements. If you contemplate using an agitated solution, you should first ascertain if it will pay you and if it is really necessary.

Question No. 651. Is one aluminum mixture more apt to crack in the mold than another? Some of our mixtures seem to give more trouble than others and many of our castings are cracked. We use two mixtures which we purchase already alloyed and do not know of what they are composed.

Answer. The mixtures containing zinc are the ones which crack the most. The aluminum and copper mixtures are the best for general casting and are extensively used, although not quite as strong as the aluminum and zinc ones. Foundrymen usually shun the aluminum and zinc mixtures whenever possible on account of the tendency to crack in the mold.

Question No. 652. In brass plating cast iron grate fronts, the color does not show up as it should. It comes up copper color. The solution stands from 18 to 20 degrees Beaume and plates other metals successfully. What is needed to overcome the copper color?

Answer. From the fact that your brass solution plates metals other than cast-iron successfully, we should infer that it is in good condition. It is possible that the cast-iron is over pickled or dirty, but we cannot understand why the solution should deposit copper on the cast-iron and brass on other metals. Cast-iron is best copper plated in a *hot* cyanide copper solution previous to brass plating as it is possible to obtain better results by doing so. It is the method generally followed.

Question No. 653. Will you give me a formula for a non-shrinkable white metal for use in making metal patterns?

Answer. The following is an excellent mixture for this purpose:

Tin	4½ lbs.
Lead	4½ lbs.
Antimony	½ lb.
Bismuth	½ lb.

The mixture melts very easily and should not be poured too hot as it runs very freely at a low temperature.

Question No. 654. What effect has nitrate of soda on a nickel plating solution? Through an error on the part of a chemical dealer, this material was shipped to me instead of sal-ammoniac as I ordered. Since the nitrate of soda was introduced, the nickel deposit comes dark colored and shows a tendency to peel.

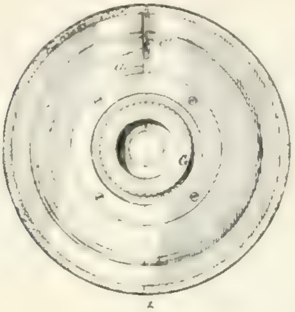
Answer. Nitrate of soda, or any other nitrate is an injurious ingredient in a nickel plating solution and causes the difficulty you mention. The original patent of Dr. Isaac Adams for nickel plating was based upon the complete removal of nitrates from the solution, and his discovery of the fact that they are injurious made it possible to deposit nickel successfully. Before that time it had not been done on account of the fact that the nitrates were *not* removed. It is a singular fact that this patent of Dr. Adams was based upon a thing that was not to be done.

Question No. 655. What is the cheapest yellow brass used in making saddlery hardware? The castings are buckles, turrets, etc. The mixture must be a cheap one or the articles could not be sold at the price which they are.

Answer. No one nowadays would think of using new metal for making saddlery hardware, as it would simply mean that the profit would be lower. The cheapest quality of yellow brass scrap or ingot is employed and then as much spelter is added as the metal will stand without becoming brittle. A small quantity of aluminum, usually one or two ounces to a hundred pounds, is used to make the metal run freely.

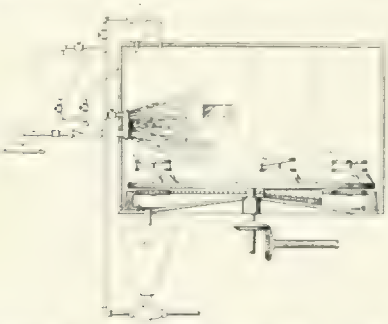
Patent Abstracts.

921,027, May 11, 1909. BUFFING WHEEL. George S. Tenney, of Walpole, Mass. Assignor to the American Glue Co., of Boston, Mass. The wheel is intended for use in instances where it is desired to fasten a strip of emery cloth to the surface. The feature of the invention lies in the manner of holding the ends of the strip.

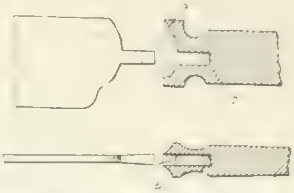


921,607, May 11, 1909. ALLOY OF SILICON. Hans Goldschmidt, of Essen, on the Ruhr, Germany. A silicon and calcium alloy free from carbon is produced by heating 2 parts of lime with 1 part of silicon. A silicon and calcium alloy containing 40 per cent. of calcium is thus formed. The mixture is heated to the melting point of cast iron in order to bring about the reaction.

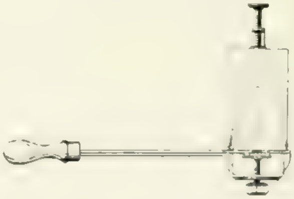
919,417, April 27, 1909. CLEANING AND POLISHING APPARATUS. Samuel C. Carroll, Dallas, Texas. A sand blast apparatus for cleaning metals automatically. The article to be cleaned is placed on the platform 21 which is revolved on the turntable 11 in front of the sand blast 25. The sand is made to fall into the hopper 30 where it is elevated to the sand blast chamber again.



920,762, May 4, 1909. TABLE KNIFE. Thomas B. Lasher, of Bridgeport, Conn. Assignor to the Holmes & Edwards Silver Co. of this city. The steel blade is made with a suitable tang which is inserted in the handle socket 10. The whole joint is then swaged down and the blade is held firmly. The process is particularly applicable to the manufacture of knives with steel blades and a handle of another metal such as, for example, German silver or sterling silver.

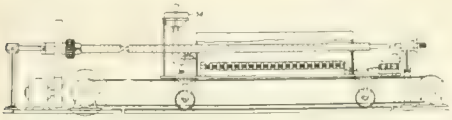


920,684, May 4, 1909. COMBINED MOLD AND CASTING DEVICE. Geo. A. Stotz, of Newark, N. J. A device for casting gold rings and similar forms of jewelry. The gold or other metal is melted in a small crucible attached to the mold so that when it has been melted by the blowpipe, the handle is turned and the metal runs into it.



920,502, May 4, 1909. SHEET PACKING. Vreeland Tompkins, of Jersey City, N. J. Assignor to the Smooth On Mfg. Co., of the same city. A sheet packing for flange joints of steam pipes. The base of the packing is asbestos and this is impregnated with a mixture of finely divided iron—such as fine iron filings—and a varnish composed of 4.8 parts of rubber, 43.2 parts of benzine, and to which is added 144 parts of the finely divided iron. It is claimed that the iron particles gradually rust and form oxide of iron, which causes the packing to become strongly adherent and tight against pressure.

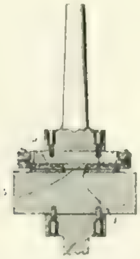
921,292, May 11, 1909. COATING OR ENAMELING APPARATUS. Myron D. Sweetck, of Albany, N. Y. A machine for automatically enameling or japanning metal rods, tubes or wire. The tube or rod is rotated by power in an oven heated by a coil through which an electric current is passed. By regulating the rheostat through which the current passes, any desired temperature may be obtained in the oven. The japan is allowed to flow from the reservoir 36 on to the surface of the tube, and as the tube is covered it is drawn forward so that it becomes evenly coated and at the same time dried by the heat of the electric coil in the oven.



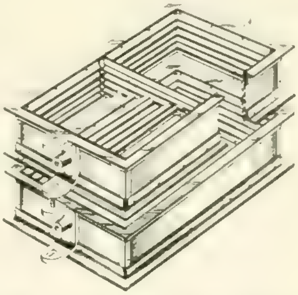
920,168, May 4, 1909. MANUFACTURE OF TUBES OR HOLLOW BODIES. Balfour F. McTear, of Rainhill, England. The invention has for its primary object the reduction in the cost of manufacture. The tubes pass between grooved rollers of successively increasing size which reduce to the desired diameter. A perusal of the complete specification is necessary for appreciating the details of the invention.

915,600, April 27, 1909. MACHINE FOR MAKING SAND MOLDS. E. J. Lahan, of Quincy, Ill. A molding machine which automatically delivers the sand to the mold and tamps it.

921,739, May 18, 1909. DEVICE FOR STRAIGHTENING METAL DISKS. Otto George Rieske, of St. Louis Park, Minnesota. Metal disks are straightened by placing them under a revolving head containing a series of balls so that the surface is gradually pressed down and any buckles or unevenness are removed.



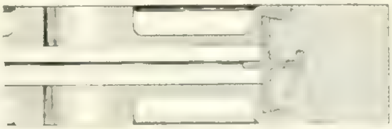
921,940, May 18, 1909. FLASK. Jas. L. Butler, of Alliance, Ohio. A foundry flask constructed of sheet steel. The sides are corrugated and the whole made so as to embody the utmost strength. The flask is intended to take the place of the usual heavy cast iron one.



921,922, May 18, 1909. SNAP FLASK FOR MOLDERS' USE. Henry G. Voight, of New Britain, Conn. The novelty of the flask is in the use of corrugated sheet steel for making the sides and also in the adjustable principle of it. A flask of strength and lightness is produced, and at the same time is adjustable to offset the wear.

920,638, May 4, 1909. PROCESS FOR DIMINISHING THE FORMATION OF FLAWS OR BLOWHOLES WHEN CASTING BLOCKS AND OTHER PIECES. Alfred Von Paravicini, of Hagen, Westphalia, Germany. The riser or feeding head of the casting is covered with a layer of white sand and then with powdered coal, the combustion of which serves to keep the metal hot. The sand acts as a non-conductor and maintains the heat of the riser. The process is suitable only for very large castings.

920,100, May 4, 1909. ABRASIVE WHEEL. Henry L. Slager, of Springfield, Ohio. The wheel is designed for the use of the well-known plastic abrasive material



on the rim. The novelty of the invention lies in the manner of holding it to the rim. The method of accomplishing this result is by [illegible] the periphery of the hub as the sketch illustrates.

Trade Items.

A new company called the Crown Metal Construction Co. has been organized at Jamestown, N. Y., with a capital stock of $75,000 to manufacture metal furniture.

The Canadian Seamless Wire Co. of Toronto, Canada, manufacturers of seamless gold and silver plated wire for jewelers' use, have moved from 71 Adelaide St. to 88 Terauley St.

The Schatz Hardware Mfg. Co. of Chappaqua, N. Y., manufacturers of hardware specialties, are to move to Poughkeepsie, N. Y., where a new plant, 80x200 feet, will be built.

The Ajax Metal Co. report a steady and increasing sale of their new lead and zinc coated sheets. This sheet is made by coating galvanized iron sheets with lead which gives them non-corrosive properties not heretofore obtained on any coated iron or steel. The sheets are used for roofing and similar purposes.

The Wm. H. Rogers Co. of Niagara Falls, N. Y., manufacturers of silver-plated wares, will concentrate their other plants at Philadelphia, Pa., and Oneida, N. Y., at Niagara Falls, N. Y., and will build a $75,000 addition to take care of the increase. The plants in the other cities will be closed. Work will shortly be started on the addition.

The Rockwell Furnace Co., 26 Cortlandt St., New York City, have issued a new catalogue of a very extensive nature, entitled "That We May Become Better Acquainted." The catalogue is illustrated with sixty-three reproductions of photographs of their furnaces in actual operation and indicating the wide range of work for which this company manufactures.

The Orford Copper Co. announce the following list of names of concerns which furnish their "Monel-Metal" in the various shapes: Valves, the Nelson Valve Co., Chestnut Hill, Pa., and Pratt & Cady Co. of Hartford, Conn; Wire, the Driver-Harris Co., Harrison, N. J., and the American Steel & Wire Co. of Worcester, Mass.; Spun and stamped sheet, Geuder, Paeschke & Frey Co. of Milwaukee, Wis.; Cold rolled sheets, the Orford Copper Co. of 43 Exchange Place, New York City; Hot rolled sheets, the American Sheet & Tin Plate, Pittsburgh, Pa.; Rods and bars, I. G. Johnson & Co., Spuyten Duyvil, N. Y., D. G. Gautier & Co., Hudson Terminal, New York City, and the Coe Brass Mfg. Co. of Ansonia, Conn.; Bolts and nuts, Russell, Burdsell & Ward Co. of Portchester, N. Y.; Castings, I. G. Johnson & Co., Spuyten Duyvil, N. Y., Oakley Steel Casting Co., Milbury, Mass., Nelson Valve Co. of Chestnut Hill, Pa.; Nails, American Steel & Wire Co., Worcester, Mass., and the U. T. Hungerford Co. of New York City.

The Watson & McDaniel Co. of Philadelphia, Pa., are to erect a new factory at Noble and Marshall Sts. Steam goods are manufactured.

The Canton Foundry & Smelting Co., Lakewood Ave. and Dillon St., Baltimore, Md., are now manufacturing brass castings, ingot brass, and ingot copper for the trade.

A new brass foundry for the making of gold, silver and fine bronze castings has been started by F. Chapon at 336 Washington St., Newark, N. J. Fine art castings will be made.

The Leach & Garner Co. of Attleboro, Mass., manufacturers of rolled gold and silver, wire and rolled plate, are to build a new factory, 50x150 feet, and three stories high.

Owing to the increase in business, the Pilling Brass Co., of Waterbury, Conn., are installing an additional stand of rolls. They will increase their line by the manufacture of heavier gauge sheet brass, bronze, German-silver and similar alloys, than they have heretofore produced.

Bulletin No. 104, which the Bristol Company of Waterbury, Conn., are mailing to the trade, although a preliminary one, lists an exceptionally complete line of recording gauges. A new method of listing these instruments has been devised so that the Bulletin shows a section of nearly every chart listed.

The plant of the Cheshire Brass Co., at West Cheshire, Conn., recently destroyed by fire, is being rebuilt of concrete construction. The plant is conducted by John H. Morse and Emil Hess and the manufacture of rolled brass, bronze and German-silver will be carried on as in the past when the new mill is completed. A new 400 H. P. engine will be installed.

The new catalogue of the Dow Chemical Co., which has been in preparation for some time, is now ready for distribution and is being sent out to the trade. It is an extensive production of one hundred and forty-five pages and contains several hundred illustrations, most of which are half-tones. The catalogue lists and illustrates many articles not heretofore shown in plating trade catalogues.

The Elizabethtown Smelting Co. has been organized at Newark, N. J., for the smelting and refining of gold, silver and platinum sweeps and similar precious metal material. A smelting plant and refinery will be built at Lyons Farms, between Newark and Elizabeth, N. J. The office is at 222 Market St., Newark, N. J. William L. Glorieux, Jr., is the president of the new company; E. P. Sinnock, vice-president, and Clarence Curren, secretary and treasurer. The capital stock is $75,000.

A new factory for the manufacture of tungsten lamps is being built by the New York & Ohio Company at Warren, Ohio.

The Aetna Smelting Co. has started in Covington, Ky., and is now in operation. Scrap metals are smelted and ingot brass produced.

Fred Grimes, 5116 West Thompson St., Philadelphia, Pa., has been appointed agent, for the State of Pennsylvania, for the Metal Dross Economy Co., Bristol, Conn.

The two most noticeable features of the Foundrymens' Convention at Cincinnati, was the progress that has been made in molding machinery and in melting furnaces for brass foundry use.

The W. B. Brown Chandelier Works of Bluffton, Ind., manufacturers of chandeliers, are to build a new addition to their works. They are now employing seventy-five hands and the shop will be equipped with electric power.

The Western Foundry Supply Co. of 50 Church St., New York City, manufacturers of foundry supplies, have had a petition in bankruptcy filed against them. This company was incorporated in July, 1908, with a capital stock of $500,000.

The Buffalo Copper & Brass Rolling Mills of Buffalo, N. Y., which have had only their copper mill in operation up to this time, are now preparing to commence the manufacture of sheet brass and are installing equipment for it. The Waterbury Farrel Foundry, through their Cleveland office, have obtained the contract for the entire rolling mill equipment.

The Brua C. Keefer Mfg. Co. have purchased the plant and business of the Henry Distin Mfg. Co., of Williamsport, Pa. This company have been in business for many years in the manufacture of brass band instruments. Brua C. Keefer has been the general manager of the company for the past twenty years. The manufacture of band instruments will be conducted as in the past and electroplating in both silver and gold wi'l be caried on as before.

The S. Obermayer Company of Cincinnati, Ohio, the well known makers of foundry supplies and equipment, announce to the trade that their "Esso Core Gum," used for making cores, has met with the approval of the trade. It is used for making cores for all classes of work. One part of this gum mixed with fifty parts of sand produces a core that is very readily separated from the finished casting, a valuable feature in making brass or bronze castings. To be able to make castings from which the core is readily separated is the desire of all brass founders, but has rarely been ralized with the ordinary compounds used. The S. Obermayer Co. issue a special catalogue 2V which tells all about their supplies for use in making brass, bronze and aluminum castings and which they will gladly send to those who may desire it.

A new factory, 12x60 feet and three stories high, will be erected by the I. C. Root Co. of Bristol, Conn., manufacturers of brass hinges and counting machines.

A new building for the manufacture of copper cable lightning rods, and other electrical apparatus, has been erected at Lincoln, Neb., by W. C. Shinn.

The Doehler Die Casting Co., formerly of 369 Park Ave., Brooklyn, N. Y., are now settled in their new factory at 187 West 9th St., in that city. Die castings are made for the trade.

N. Chenegros, who conducts a brass foundry at 30 Franklin St., Newark, N. J., and who makes fine art castings in gold, silver and bronze, will increase his plant by taking the entire building.

The Pullman Company of Pullman, Ill., car manufacturers, are to erect new buildings and among them will be a new brass foundry. It is stated that some $3,000,000 will be spent upon the new buildings as a whole.

The Hampton-Rhodes Cutlery Co. will shortly start in Norfolk, Va., for the manufacture of table knives. A new form of seamless hollow handle, the invention of G. F. Hemming, will be manufactured for the knives, and silver plating wil be carried on for which a plant will be installed.

The Matthews Mfg. Co., 12 Arington St., Newark, N. J., manufacturers of silver-deposit ware, will, in the near future, manufacture hollow-ware. They have outgrown their present quarters and have taken additional space in the building in which they are located which gives them double the previous floor space.

The Levett Manufacturing Company of Matawan, N. J., now have their factory at this place in full operation and are prepared to furnish electroplaters supplies and equipment of all descriptions. The manufacturing facilities are of the best and the experience of the officers of the company in the production of this line of goods, is a sufficient indication that customers will receive standard quality goods and the latest designs of equipment.

The "Reyelbee" furnace for melting made by the Hawley Down Draft Company of Chicago, Ill., and New York City, uses coal or coke for fuel and a crucible for melting the metal. The furnace is of the tilting type and the crucible is not taken from the furnace. In this manner, not only is the life of the crucible prolonged, but it does not cool down. An important feature of the "Reyelbee" furnace is the pre-heating of the air used for supplying it. After the air leaves the blast pipe it passes down between the fire-brick lining which heats it so that hot instead of cold air is constantly fed to the fuel. In this manner the heat is greater and the coal or coke more completely consumed than when the blast is applied directly to the fire.

The Lionel Mfg. Co. has started to manufacture electrical toys in the factory of the Pfleghar Mfg. Co. Winchester Ave., New Haven, Conn.

The plant of the Revere Copper Co., at Canton, Mass., one of the oldest in the United States, was sold on May 27th, to the Plymouth Rubber Co., for $13,000. The plant has been idle for many years.

A new nickel plating room will be equipped during the coming summer by the Bowmanville Foundry Co. of Bowmanville, Ont. Canada and an addition will be made to the works for this purpose.

The E. I. Du Pont de Nemours Powder Co. of Wilmington, Del., the largest manufacturers of explosives in the United States, are about to engage in the manufacture of cartridge shells and are obtaining the equipment for this purpose.

The Springfield Facing Co. are manufacturers of Brown's Celebrated Charcoal Facing used so extensively in brass foundry work for parting. When charcoal of this kind is once tried it never fails to give the utmost satisfaction. and the large number of brass foundries using it, bear witness to this fact.

The new Standard Brass & Copper Tube Co., recently incorporated at New London, Conn., will make seamless brass and copper tubing up to 2½ inches. It is expected that the mill will be in operation by August. The incorporators are Roger J. Heisler and Wm. M. Parke of New York City, and F. J. Loomis, 46 Alger Place, New London, Conn. It is expected that the chief product will be iron pipe sizes of tubing.

The Whiting Mfg. Co., 4th St. and Lafayette Place, New York City, manufacturers of sterling silver ware, have acquired a plot of ground in Bridgeport, Conn., on the N. Y., N. H. & H. R. R. near Bruce Ave., and will erect a large factory on it. The entire plant will then be moved to Bridgeport. Over $100,000 will be spent on the buildings. The Whiting Mfg. Co. are one of the largest makers of sterling silver ware in the United States and are capitalized at $1,000,000. It is expected that from 400 to 500 hands will be employed.

The Pennsylvania Foundry Co. of York, Pa., whose plant was recently destroyed by fire, have purchased a new plot of ground in that city and will erect a new foundry upon it. The lot is 225x275 feet and the foundry building will be 100x100 of steel and brick construction. A pattern shop and office building will also be erected. It is expected that the new plant will employ 100 hands. This company makes a specialty of brass, bronze, aluminum, manganese bronze and other similar kinds of castings. An application has also been made for a charter and the company will be incorporated with a capital stock of $200,000. The brass foundry is in charge of John H. Cochrane.

The Buffalo Scale Co. of Buffalo, N. Y., scale manufacturers, are to install a new and complete exhaust tumbling equipment.

The Vulcan Detinning Co., 157 Cedar St., New York City, and with works at Sewaren, N. J., and Streator, Ill., purchase tin plate scrap in any size and shape for the recovery of the tin on it.

The Lumen Bearing Co. of Buffalo, N. Y., and Toronto, Canada, are now making die pressure castings for the trade and of special hard alloys which can be used in many instances to replace brass castings.

The Crouse-Hinds Co. of Syracuse, N. Y., manufacturers of electrical swithboards, switches, time registers, etc., have purchased a site and a new plant, consisting of five buildings, will be erected.

The Foundry Supply Association, which conducted the exhibition at the Cincinnati Foundrymen's Convention realized a good profit from it as they had a balance of practically $6,000 in the treasury at the close of the meeting.

The E. H. H. Smith Silver Co. of Bruce Ave., Bridgeport, Conn., are about to commence the manufacture of silver plated hollow-ware and are now engaged in making molds and dies for this purpose. Heretofore nothing but flat ware has been manufactured.

Malmquist Bros., Hall Ave., Wallingford, Conn., who have had large experience in the leading art metal centre of the United States, make a specialty of designing dies and sinking them for the manufacture of spoons, forks, and other kinds of flat ware as well as for making all kinds of hollow-ware. They also make dies for medals, badges, etc. Their experience in this line of work and their location particularly fit them for such work.

The Ross-Tacony Crucible Company of Tacony, Philadelphia, Pa., make a specialty of crucibles for the Steele-Harvey, Rockwell, and other forms of oil burning tilting crucible furnaces. They have made a study of crucible mixtures for this purpose and with the result of producing a crucible for these furnaces which never fails to give the utmost satisfaction. They have discovered the right mixture for the purpose after a series of experiments extending over a number of years.

It is expected that an order will shortly be signed by the President creating the "Central Board of Awards" which will award contracts after bids for supplies have been opened. This Board will award the contracts for all Government departments, although the bids are made to the departments themselves. It is expected that this system will avoid the variation in bids for the same material that now exists when they are awarded by the separate Government departments. The question is illustrated in the case of coal for which the Government pays several different prices although delivered in the same city.

A brass foundry and electroplating plant will be started by the H. Smith Machine Co., 51 Goodwin St., Paterson, N. J.

Batcheller, Clark & Batcheller, 90 West St., New York City, sand-blast manufacturers, have made an assignment for the benefit of their creditors.

The Jonathan Bartley Crucible Co. of Trenton, N. J., have reprinted a portion of their catalogue relating to "Graphite and Mining in Ceylon" and are sending it to the trade.

The American Safe & Lock Co. has been incorporated at Cincinnati, Ohio, with a capital stock of $25,000 to manufacture safes and locks. The location of the plant will be at 206 Lawrence St.

The Lincoln Electric Co. has been incorporated at Hammondsport, N. Y. to manufacture electrical instruments, batteries and similar electrical goods. The capital stock is $75,000.

The laboratory of engineering chemistry conducted by Arthur D. Little at 93 Broad St., Boston, Mass., has been incorporated. under the name of Arthur D. Little, Inc. The line of work will be the same as in the past.

The Celluloid Zapon Co., Metropolitan Bldg., New York City and with works at Stamford, Conn., have issued a new catalogue of their lacquers giving a detailed description of each and the use for which it is intended. It will be sent free of charge to those interested.

The Walker & Schultz Foundry Co. of Lansing, Mich., have been succeeded by the Michigan Brass & Iron Works, with a capital stock of $20,000. A foundry will be erected on Cedar St. Brass, bronze and aluminum castings, as well as gray iron, will be made.

As the Abbott Ball Company of 14 Hicks St., Hartford, Conn., manufacture steel balls exclusively for burnishing small metal goods by tumbling, and at a price that will admit of everyone using them, manufacturers should investigate the matter of burnishing work by tumbling with steel balls. It saves hand labor in polishing.

The Bridgeport Brass Co. of Bridgeport, Conn., are to build a new seamless tube mill to cost $300,000. A contract for the pumping engine for the hydraulic draw benches has already been given to the Heisler Mfg. Co. of St. Marys, Ohio, and the mill will be equipped with the most modern machinery.

The F. A. Williams & Son, Inc., of 75 Montgomery St., Jersey City, N. J., and with the brass foundry at 105 Plymouth St., are spending over $10,000 in new foundry equipment, including a 10,000 lbs. crane, sand blast, air compressor, furnaces, core ovens, engine and also a complete equipment for dipping. With this equipment the foundry will be brought up to the highest standard.

Unique souvenirs, in the shape of a scarf pin, were presented to visitors at the Foundrymens' Convention at Cincinnati by the Carborundum Company of Niagara Falls, N. Y. The scarf pin was made of crystals of carborundum.

The J. W. Paxson Co. of Philadelphia, Pa., exhibited at the Foundrymens' Convention at Cincinnati, their roll-over molding machine especially adapted for brass foundry use and which takes standard iron flasks and uses regular patterns. They also exhibited aluminum flasks and which are now coming into use on account of their lightness.

Personal.

T. P. Gourley is now associated with the Hawley Down Draft Co., of Chicago, Ill., and New York City.

H. R. Linton, formerly with the Means Foundry & Machine Co. of Steubenville, Ohio, is now connected with the Centre Foundry & Machine Co. of Wheeling, W Va., as general manager.

Harry E. Kerr, superintendent of the D. T. Williams Valve Co. of Cincinnati. Ohio, has resigned to accept a similar position with a large Eastern concern.

Cecil H. Wilson of the Sheffield Smelting Co., Sheffield, England, gold and silver smelters and refiners, who has been visiting the United States and Canada, has now returned.

W. K. Wright, for the past thirty five years superintendent of the O. B. North Co. of New Haven, Conn., manufacturers of saddlery hardware, has resigned his position with them.

Guy L. Meaker, formerly president of the Meaker Co. of Chicago, Ill., manufacturers of electrogalvanizing and electroplating devices, is now assistant superintendent of the works of the American Steel & Wire Co. at Joliet, Ill.

Admiral W. H. Bronson has been elected a director of the International Nickel Co. He succeeds the late Joseph Wharton on the board of directors.

Obituary.

C. E. Evans, of the Evans Stamping & Plating Co., Taunton, Mass., died on May 20, aged 50 years.

Frederick Kato, president of the Kato Mfg. Co. of Jersey City, N. J., manufacturers of art bronzes, died at his home in that city on April 20, aged 43. He was a mineralogist of note and was a prominent member of many learned societies. He left a collection of minerals which has been presented to the Jersey City High School, to be known as the Frederick Kato collection.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Acetone, pure, 98-99%	lb.	.22
Acid, Acetic, pure, 30%	lb.	.07
Acid, Arsenious (White Arsenic)	lb.	.20
Acid, Benzoic	lb.	.55
Acid, Boracic (Boric), pure	lb.	.12
Acid, Hydrochloric, see Acid, Muriatic		
Acid, Hydrofluoric, 30%	lb.	.04
Acid, Hydrofluoric, 50%	lb.	.10
Acid, **Muriatic, 20°**	lb.	.02
Acid, **Muriatic, c.p.,** 20	lb.	.07
Acid, Nitric, 38	lb.	.05⅝
Acid, Nitric, 40	lb.	.05⅞
Acid, Nitric, 42	lb.	.06¼
Acid, Nitric, c.p.	lb.	.08
Acid, Sulphuric, 66°	lb.	.01¾
Acid, Sulphuric, c.p.	lb.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	lb.	.04
Aluminum, Sulphate	lb.	.06
Aluminum, Metallic, in ingots	lb.	.24
Aqua-Fortis, see Acid, Nitric.		
Ammonia Water (Aqua-Ammonia), 20°	lb.	.04¾
Ammonia Water (Aqua Ammonia), 26	lb.	.06¼
Ammonia Water, c.p.	lb.	.08
Ammonium Carbonate, lump	lb.	.15
Ammonium Chloride (Sal Ammoniac)	lb.	.12
Ammonium Hydrosulphuret	lb.	.30
Ammonium Sulphate	lb.	.07
Ammonium Suphocyanate	lb.	.50
Amyl Acetate	gal.	1.85
Antimony	lb.	.08¼
Antimony Chloride (Butter of Antimony)	lb.	.23
Arsenic, Metallic	lb.	.15
Arsenic, White (Acid Arsenious)	lb.	.20
Argols, White (Cream of Tartar)	lb.	.31
Asphaltum, Commercial	lb.	.05
Asphaltum, Egyptian (Bitumen)	lb.	.30
Benzine	gal.	.20
Benzol, Pure	gal.	.75
Bismuth, Metallic	lb.	1.75
Bitumen, see Asphaltum.		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	lb.	.10
Borax Glass	lb.	.35
Cadmium, Metallic	lb.	.75
Carbon Bisulphide	lb.	.10
Calcium Carbonate (Precipitated Chalk)	lb.	.10
Chrome Green	lb.	.50
Copper, Lake (cask)	lb.	.13⅞
Coppetr, Lake (carload)	lb.	.13⅝
Copper, Electrolytic (carload)	lb.	.13½
Copper, Electrolytic (cask)	lb.	.13¾
Copper, Casting (carload)	lb.	.13⅜
Copper, Casting (cask)	lb.	.13⅝
Copper Acetate (Verdigris)	lb.	.35
Copper Carbonate, dry	lb.	.25
Copper Sulphate (Blue-Stone)	lb.	.09
Copperas, see Iron Sulphate.		
Corrosive Sublimate, see Mercury Bichloride.		
Cream-Tartar, see Potassium Bitartarate.		
Cryolite	lb.	.12
Cyanide, see Potassium Cyanide.		
Dextrin	lb.	.15
Emery Flour	lb.	.04
Emery, F F & F F F	lb.	.03
Flint, powdered	lb.	.01
Fluor Spar	lb.	.01¼
Fusel Oil	gal.	1.75
Gelatine, Nelson's	lb.	1.15
Gold Chloride	dwt.	.60
Gum Copal	lb.	.30
Gum Damar	lb.	.30
Gum Elemi	lb.	.70
Gum Guaicum	lb.	.26
Gum Mastic	lb.	.70
Gum Sandarac	lb.	.35
Gum Shellac, brown	lb.	.50
Gum Shellac, white	lb.	.60
Iron Perchloride	lb.	.25
Iron Sulphate (Copperas)	lb.	.05
Lead Acetate (Sugar of Lead)	lb.	.15
Lead Pig	lb	.04⅜
Lead Red	lb	.12
Lead, Yellow Oxide (Litharge)	lb.	.12
Liver of Sulphur, see Potassium Sulphide.		
Manganese, Ferro, 80%	lb.	.10
Manganese, Metallic, pure	lb.	.75
Magnesium, Metallic	lb.	1.25
Mercury Bichloride (Corrosive Sublimate)	lb.	.93
Mercury, Metallic (Quick Silver)	lb.	.89
Mercury Nitrate	lb.	1.50
Mercury Oxide, yellow	lb.	1.80
Nickel and Ammonium Sulphate (Double Salts)	lb.	.16
Nickel Carbonate, dry	lb.	.60
Nickel Chloride	lb.	.50
Nickel, Metallic	lb.	.47
Nickel Sulphate (Single Salts)	lb.	.25
Nitre (Saltpetre), see Potassium Nitrate.		
Oil, Palm	lb.	.08
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	lb.	.15
Pearlash, see Potassium Carbonate.		
Phosphorus, yellow	lb.	.40
Phosphorus, red	lb.	1.10
Pitch	lb.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	12.50
Platinum, Metallic	oz.	23.50
Potash-by-Alcohol, **in sticks**	lb.	.50
Potash, Caustic (Potassium Hydrate)	lb.	.08
Potassium Bichromate	lb.	.14
Potassium Bitartarate (Cream of		
Potassium Carbonate (Pearlash)	lb.	.10
Potassium Chlorate	lb.	.15
Potassium Cyanide	lb.	.25
Potassium Iodide	lb.	2.25
Potassium Nitrate (Nitre or Saltpetre)	lb.	.10
Potassium Permanganate	lb.	.17
Potassium, Red Prussiate	lb.	.60
Potassium, Yellow Prussiate	lb.	.24
Potassium Sulphide (Liver of Sulphur)	lb.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	lb.	.70
Tartar)	lb.	.31
Pumice, Ground	lb.	.05
Quartz, Powdered	lb.	.01
Rosin, Yellow	lb.	.04
Sal-Ammoniac, see Ammonium Chloride.		
Sal-Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Fine	oz.	.53
Silver **Nitrate, crystals**	oz.	.50
Soda-Ash	lb.	.05
Silver, Fine	oz.	.52⅞
Sodium Biborate, see Borax.		
Sodium Bisulphite	lb.	.15
Sodium Carbonate (Sal-Soda), crystals	lb.	.02
Sodium Hydrate (Caustic Soda)	lb.	.05
Sodium Hydrate (Caustic Soda) by Alcohol (in sticks)	lb.	.45
Sodium Hyposulphite ("Hypo")	lb.	.04
Sodium, Metallic	lb.	.90
Sodium Nitrate	lb.	.05
Sodium Phosphate	lb.	.09
Sodium Silicate (Water-Glass)	lb.	.04
Soot, Calcined	lb.	.15
Spelter, see Zinc.		
Spermacetti	lb.	.40
Sugar of Lead, see Lead Acetate.		
Sulphur (Brimstone), in lump	lb.	.05
Tin Chloride	lb.	.43
Tin, Metallic	lb.	.29¼
Turpentine, Venice	lb.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water-Glass, see Sodium Silicate.		
Wax, Beeswax, yellow	lb.	.45
Wax, Carnauba	lb.	.70
Wax, Japan	lb.	.20
Whiting (Ground Chalk)	lb.	.02
Zinc Carbonate, dry	lb.	.19
Zinc Chloride	lb.	.12
Zinc Sulphate	lb.	.06
Zinc (spelter)	lb.	.05⅜

THE
BRASS WORLD
AND
PLATERS' GUIDE

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Silver-Solder and its Advantages.

One naturally associates high cost with the name of silver-solder. In reality, it is not as expensive as might be expected, and when results are to be taken into consideration, it is actually the cheapest for many kinds of work.

The advantage of silver-solder lies in the freedom with which it will melt and flow. While it is not as fusible as the soft-solders composed of tin and lead, it is intermediate between them and the so-called "spelter-solders" or those composed of copper and zinc.

In addition to the low melting point of silver-solder, it flows very readily and without the formation of the quantity of oxide that follows when spelter-solder is used. Silver itself melts without any oxidation at all, and this fact explains the freedom with which silver-solder flows.

Another valuable feature of silver-solder is the fact that it may be rolled into sheet or drawn into wire and may, therefore, be employed for many classes of work in which spelter-solder could not be used.

Silver-solder makes the strongest joint of any known solder and as it melts so readily there is less danger of "burning" the joint. It can be made in a number of different grades of fusibility, cost and color, and its use is advocated wherever possible. The results obtained by it cannot be equalled or even approached by any other hard solder. It is equally applicable to steel, iron, copper, brass, German-silver, sterling-silver and other similar alloys. It is widely used, of course, but should be employed even more extensively than it now is.

The German Cyanide Trust.

In the *Daily Consular and Trade Report* for June 23, 1909, under the heading "Output of Cyanide Controlled by a Frankfort Firm," the following statement is made in regard to the condition of the cyanide industry in Germany:

"Publication on January 30 of a brief report from this consulate-general on the German cyanide trust having aroused the interest of American buyers of cyanide, it may serve some useful purpose to define more exactly the nature of this trust. The whole of the German output of cyanide, so far as can be learned, is controlled by the Deutsche Gold- und Silber-Scheideanstalt, of Frankfort, which has agreements with the various manufacturers to take over their product, or to compensate them in some manner for keeping out of the market. Five different firms, all mentioned in the report of January 30, practically confirm the following written statement of one of their number:

"I should advise you to apply for information to the Deutsche Gold und Silber Scheideanstalt, in the hands of which, so far as we know, the sale of the production of all German cyanide makers is united."

The concern mentioned has an American house, which controls the sale of German cyanide in the United States. Orders from Mexico are executed from Frankfort, and a Hamburg firm is the sole agent for Africa and Australia.

From being a losing business, demoralized by low prices, the sale of cyanide has become a presumably profitable branch of the general business of the Deutsche Gold- und Silber Scheideanstalt, which, on March 31, 1908, according to the published and freely circulated annual report, paid 30 per cent. dividends on a capital of $2,380,000, besides accumulating a reserve of $1,850,400 and unpaid profits of $238,000.

The same report shows that the Frankfort company has relations with three American concerns, one of which sells its products in the United States, and it states that these companies, while suffering from a decrease in business, have been spared large direct losses, so that dividends as in the previous year could be paid.

The report further shows that the Deutsche Gold und Silber Scheideanstalt has established, or in part supported, eight concerns in Austria, France, Germany, and Switzerland.

According to information from reliable Hamburg exporters, it has been impossible, since the organization of this trust, commonly described as the syndicate, to buy cyanide in the open market for export to the United States."

Aluminum Finally Electrodeposited.

In an interesting paper delivered before the American Electrochemical Society at the Niagara Falls meeting on May 6th, by Prof. S. A. Tucker and E. G. Thomssen, of Columbia University, a series of experiments were described which resulted in the electrodeposition of aluminum from an aqueous solution. To them undoubtedly belongs the credit of having been the first to actually electrodeposit aluminum. An abstract of the paper is printed elsewhere in this issue.

Although the subject of electrodepositing aluminum has been given much thought, and many experiments have been conducted upon it, it is generally conceded that no one up to this time had succeeded in depositing it from an aqueous solution. While the results obtained by the aforesaid investigators are of no value commercially, they are of much interest from a scientific standpoint as indicating that the electrodeposition of aluminum is actually possible.

While many of the earlier investigators *claimed* to have electrodeposited aluminum, it was subsequently found that the deposit obtained was not aluminum at all, but some other metal, usually iron, present as an impurity in the aluminum salt used as the electrolyte.

Roseleur was the first to electrodeposit platinum and discovered the process in 1846, and in 1847 presented to Louis Philippe, King of France, an ewer and its basin upon which about 400 grams (about 13 oz.) of platinum had been deposited.

The Manufacture of Railway Bearings in Australia.

The State of Queensland comprises the northeastern portion of the Commonwealth of Australia. This interesting and progressive country, as it is well known, is nearly as large as the United States. The State of Queensland is the third largest in that country, and has an area of 668,497 square miles and over 2,000 miles of seacoast. It is, therefore, as large as that portion of the United States west of the Rocky Mountains.

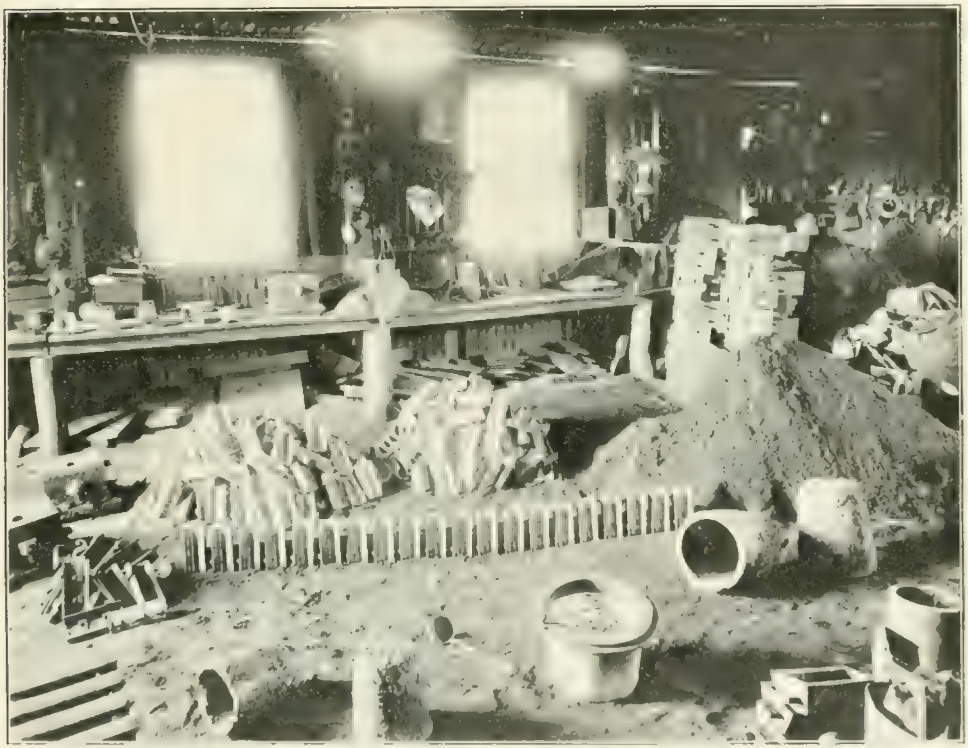
Fig. 1. Interior of the Norman Brass Foundry, Brisbane Australia, Showing Car Brasses Ready to be Lined.

The capital and largest city in the State of Queensland is Brisbane. It has a population of over 100,000 and is located in the extreme eastern end of the continent. It is situated on a river of the same name, twenty-five miles from its mouth. The nearest large city is Sydney, and which may be reached from Brisbane by steamer or by railroad. The rail journey takes about twenty-six hours. Steamers carrying mail ply between Brisbane and northern ports and numerous railways reach far out into the interior and along the coast. As a railway terminus there is naturally a large business in railway supplies.

There are a number of brass foundries in Brisbane and one of the most important is the Norman Brass Foundry of Norman Park and of which T. Wilson is the proprietor. Their work consists of a general line of brass, bronze and aluminum castings and a specialty is made of railway bearings, and of which a study has been made with the result that a large business has been worked up in the Australian rail way trade. The demand for railway bearings in this country is, of course, rapidly increasing on account of the expansion of the railway system. Conditions are the same in that country as in our own, and where there are railways a constant demand for bearings is created.

The metal in the Norman Brass Foundry is melted in crucibles, as may be noticed by referring to Fig. 1, in which some are shown after having been used for some time. Coke is used for the fuel. As previously mentioned, the foundry makes a specialty of railway bearings and have succeeded in evolving and patenting a new one, which is creating much interest among the railway master mechanics of Australia, and is destined to become the standard bearing in that country.

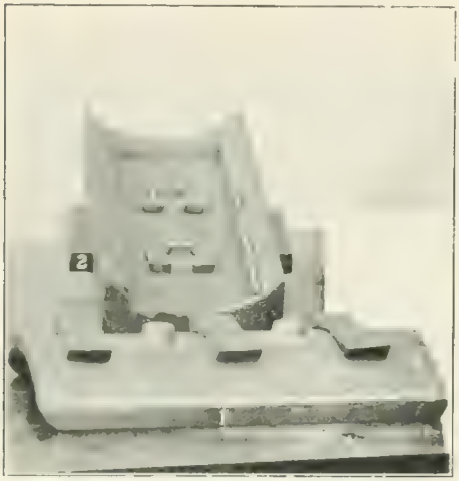

Fig. 2. Duplex Car Bearing as Made in Norman Brass Foundry.

This bearing, views of which are shown in Figs. 1 and 2, is composed of two parts, the liner and the backing. The liner is made of bronze suitable for bearings, and the backing may be made of a cheaper metal, such as cast iron. The liner and back are held together by running in babbitt or other soft metal. The advantage claimed for this bearing is that the liners may be stocked and quickly replaced whenever desired. The old back may be used over and over again, thus giving a cheap bearing of high grade. It is stated that the bearings can be relined at the rate of 20 per hour. The method followed in relining the bearing is to place it in a crucible or oven and heat. The babbitt metal runs out, allowing the parts to be separated. The new liner is then set in, and the babbitt metal run in when the bearing is completed.

It has been found in Australia, after exhaustive tests, that bronze is better suited for railway bearings than babbitt metal. This is partially because the bronze stands the end thrust of the axle better than babbitt metal, and partly because the bronze is more adapted for the weight of the car on the axle, and if made of good bearing bronze and carefully fitted, it is less apt to give trouble. It will readily be appreciated that by the use of a bronze liner and a bronze shell, a bearing is produced that is analogous to a bronze bearing lined with babbitt metal. The bronze, in this case, takes the place of the babbitt while the cast iron acts like the bronze backing into which the babbitt metal is poured. Cheapness, of course, is the essential feature of it.

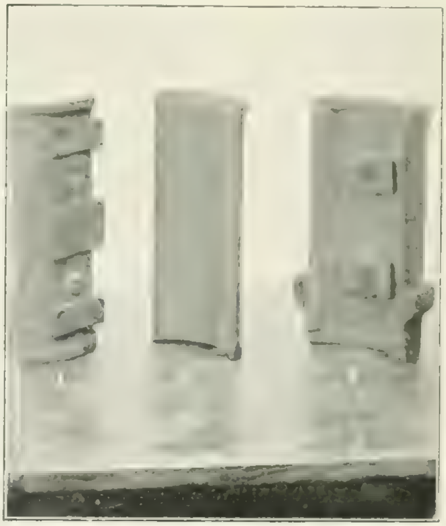

Fig. 3. Ordinary Babbitted Car Bearing as Used on Australian Railways.

In Fig. 1 the interior of the Norman Park Bronze Foundry of Brisbane is shown. A number of bearings ready for running in the intermediate babbitt metal are shown by 1. The babbitt metal that is used is the well-known antimonial or hard lead containing from 15 to 20 per cent of antimony and the remainder lead. This answers the purpose equally as well as a more expensive metal. A few completed shells and liners are shown by 2.

The method of lining is to place the liner in the shell and the whole is placed between two flat bars of iron, bolted at the ends and leaving a space for the bearing to be placed in position between the bars. Wedges are placed in each bearing and they are ready for pouring the hard lead in. The front bar and wedges are not shown in the photograph reproduced in Fig. 1 in order to provide a good view of the process used in lining.

In Fig. 2 the bearing in detail is shown. This is the type of bearing made in the Norman Brass Foundry with the removable liner. In Fig. 3 the photograph of the regular type of railway bearing used by most Australian railways at present. It consists of a solid gun metal casting, bored out, and then lined with babbitt metal. The lining is quite thin, of course, and is analogous to the freight car bearing used in the United States. On passenger and street cars, solid bronze bearings are now used in the United States and are not lined with babbitt metal except in rare instances. If well fitted, and of good quality of metal it is usually considered that they are superior as far as wear is concerned. Much of the unsatisfactory experience with unlined bronze bearings has been caused by the use of a bronze mixture for them not adapted for bearings, and it is probable that the future will witness the same condition existing in Australia.

A Bit of Nickel-Plating History.

That nickel-plating has undergone a process of evolution is indicated from the following statement, made by the celebrated French electrometallurgist, Roseleur, in 1846. It is his own personal opinion about the future of nickel-plating:

"Nickel deposited in the wet way is whitish with a slightly yellow tinge, resembling the alloy for cymbals. Its dead lustre is dull and pearl gray, and is easily obtained by dissolving the nitrate of nickel in its own weight of ammonia, and diluting the whole with 20 to 30 times its volume of liquid bisulphite of soda, marking about 24 degrees Baumé.

"This special application is without industrial uses, since nickel costs about five times as much as copper, and presents the same disadvantages, including poisonous properties."

The Deposition of Aluminum from Aqueous Solutions.*

By S. A. Tucker and E. G. Thomsen.

From experiments carried on with copper and other metals deposited on a rotating cathode, it is known that the current density can be raised very greatly and the nature of the deposit generally improved. It seemed possible that if the speed of rotation could be sufficiently increased, the current density might be raised to such a high value that metals could be deposited from aqueous solutions which, under ordinary circumstances, would not deposit at all. It was determined to try the effect of a rapidly revolving cathode in the case of aluminum, as it is well known to be impossible to deposit this metal from an aqueous solution upon a stationary electrode.

The first experiments were, therefore, carried on with a cathode revolving at 3,200 revolutions per minute. The electrolyte was an aqueous solution of aluminum chloride or aluminum sulphate with an anode of sheet aluminum. The cathode consisted of a brass or copper rod. No sure indication of a metallic deposit was obtained.

By using a very concentrated or pasty solution of aluminum chloride and rotating the cathode as fast as possible, better results were obtained. The blackening of the cathode was much more marked. This gave the clue to the requirements for depositing the metal, as it indicated the necessity for higher speeds of rotation.

With the construction of a better bearing running at about 5,000 revolutions per minute, the deposit was still black, but upon closer inspection a trace of metal substance resembling aluminum was obtained. It was found that on quickly withdrawing the bath from the cathode which was still revolving, that the deposit had a metallic lustre for a moment. However, it turned black almost instantly upon exposure to the air.

The speed of rotation was raised to 10,000 revolutions per minute and much better results were obtained. The deposits on being first withdrawn from the electrolyte were metallic aluminum, but after a time tended to blacken on exposure to the air. This is probably due to the fine state of division in which it is formed at the cathode. In order to prove that the deposits were really aluminum, a number of them were dissolved in potassium hydroxide and the test left no doubt as to the certainty of the deposit. One noticeable feature in connection with the deposit was the fact that the aluminum obtained at the highest speed retained its lustre longer than when produced at a lower speed. Several of the deposits were quickly placed in melted paraffine to protect them from the air and remained bright for weeks.

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* Abstract of a paper read at the meeting of the American Electrochemical Society at Niagara Falls, May 6-8, [illegible]

The deposits were always extremely thin and the time of deposition a few minutes only, as running for longer periods did not give as good results.

Upon repeating the experiments with a special form of air turbine in which a speed of from 15,000 to 20,000 revolutions was obtained, even better results were produced. It was found possible to buff some of the deposits which were slightly black, on a buffing lathe with rouge. The deposit then had the same appearance as polished aluminum. The conditions under which these later experiments were obtained were as follows:

Cathode: Brass, 5 mm. diameter.

Anode: Sheet Aluminum, 35 sq. cm.

Electrolyte: Pasty Solution of Aluminum Chloride.

Temperature: 30 to 40 degrees C.

Duration of Electrolysis: Five to Six Minutes.

Revolution of Cathode: 15,000 per Minute.

Current in Amperes: Two to Four.

Voltage: Varied; Average 15.

Current Density at Anode: 0.085 amperes per sq. cm.

The deposit was only obtained on the eccentric portion of the cathode, which portion had an area of 200 sq. mm. giving a current density at this actual cathode of 2 amperes per sq. cm.

The practical value of such a method for depositing aluminum is indeed small, as the quantity of metal obtained is but a small part of that theoretically obtainable for the current used. The voltage necessary is also very high and the practical difficulty of obtaining such high speeds of rotation very great. The experiments are interesting, however, as showing that under certain conditions it is possible to deposit aluminum from aqueous solutions.

Correspondence.

The Inventor of Phosphor-Bronze.

Editor:

In THE BRASS WORLD, May, 1909, page 161, in connection with patent litigation respecting "Plastic-Bronze," appears a statement that Mr. Alexander Dick, of England, was the inventor of the "Phosphor-Bronze" alloy for bearings.

Inasmuch as in 1874, when The Phosphor Bronze Company, Ltd., was formed, we purchased the British patent rights of Dr. Künzel, of Blasewitz, in the Kingdom of Saxony, through our patent agent, Mr. Vaughan, F. C. S., we think the statement should not go uncontradicted, but it may be explained that Mr. Alexander Dick was the managing director of this company in 1874 which may account for the error. We believe that Mr. C. Adolph Dick purchased the United States patent rights in 1874. He started the Phosphor Bronze Smelting Co. in Philadelphia, Pa.

So as to give good grounds for the disclaimer, we send you herewith the British Patent Specification No. 1628 of May 8, 1874, being a communication from abroad by Charles Künzel, Doctor of Philosophy.

The Phosphor Bronze Co., Ltd.,
Richard Lagerwall.
Managing Director.

87 *Sumner St.,*
London, England.

Process of Hardening Tantalum.

A process of hardening tantalum has been patented by Werner Von Bolton, of the Siemens & Halske Co., of Berlin, Germany. It consists of alloying the metallic tantalum with more than 1 per cent and less than 10 per cent of silicon. From 2 to 3 per cent. of silicon is recommended as the best proportions. With such additions, the ductility of the tantalum is not impaired and it may be drawn into wire like the pure metal. At the same time the hardness is increased. The use of the alloy is in the making of incandescent electric light filaments, which have heretofore been made of the pure tantalum. The hardness of the tantalum and silicon alloy renders the wire made from it less fragile when in use.

Making up Small Electroplating Solutions, Particularly those of Gold, by the Use of a Porous Cup.

While the use of a porous cup for making up electroplating solutions is quite old and theoretically presents nothing new, the method of using it is either incompletely described in text-books on electroplating, or no mention at all is made of it. As the process was one of the first used in making electroplating solutions, authors undoubtedly consider it too ancient to be worthy of mention. In reality, it is a method particularly suited for making up small solutions and is especially applicable to the production of gold solutions, as they are usually made in small quantities.

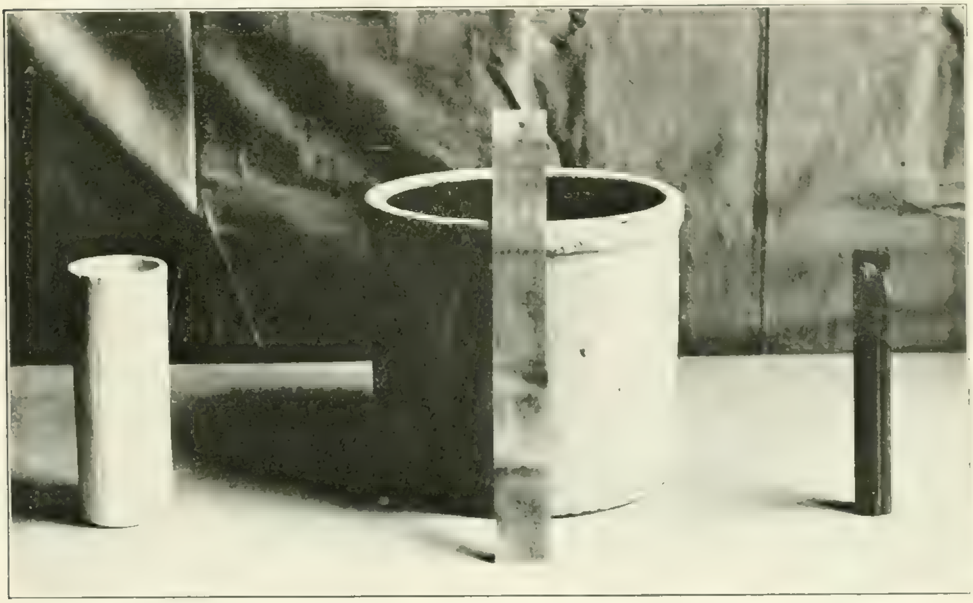


Fig. 1. The Stone-Crock, Porous-Cup, Anode and Carbon Used in Making up a Solution by the "Porous Cup Method."

The use of the porous cup in making up an electroplating solution avoids the necessity of making a salt of the metal to be deposited. All that is required is an anode of the metal itself. In the case of gold this is particularly advantageous as it avoids the dissolving of the gold in aqua regia and the evaporation of the solution with the danger of loss or injury to the chloride of gold. As a usual rule, platers who have had a limited experience in making chloride of gold, find its manufacture annoying on account of lack of facilities for its manufacture. Another excellent feature of the use of the porous cup is the fact that no foreign salts are introduced into the solution, as they are when the chloride of gold is employed. When chloride of gold is dissolved in potassium cyanide, potassium chloride is formed which is not only unnecessary but generally considered more or less harmful, especially when particular shades of gold are desired. Then, too, inexperienced platers rarely remove all of the free acid from the chloride of gold during the evaporation so that part of the cyanide is decomposed by it with not only the formation of more potassium chloride, but also a lessening of the desired quantity of free cyanide in the solution. The porous cup, therefore, obviates these difficulties and allows the production of a gold plating solution (or other plating solution) free from any foreign matter whatever. There is only one disadvantage in the use of the porous cup and that is the length of time consumed in making up the solution. While this feature is of little importance in making up a small solution, it is quite objectionable in the case of large ones, and for this reason is not employed for this class of work. Now and then, platers are found who make up large solutions in this manner; but it is usually considered too time-consuming for general work. The use of the porous cup, therefore, is practically confined to the manufacture of small electroplating baths such as those of gold and silver. The results obtained by it cannot be equalled by any other process.

The Porous Cup and Its Theory.

The porous cup used in the process is shown in Figs. 1 and 2. It consists of a white clay of a good quality and free from cracks and fissures and *not glazed*. The clay must not be too close-grained, nor the cup too thick or the action will be too slow in making up the plating solution. If the cup is glazed it will not work at all. The first use of the porous cup was in batteries and the majority of those sold on the market are shaped for this purpose. They may be obtained either round or square and are quite cheap. The sizes vary from one holding an ounce up to the quart size. The price ranges from 10 cents for the smallest up to about 75 cents for the largest size. Still larger sizes may be made to order, but the stock sizes usually are sufficient for the majority of purposes. The size of the porous cup used for making up a gallon of solution in the regular 1 gallon stone crock is about 8 in. high and 3 in. in diameter, although a small size may be used by placing something in the bottom of the jar for it to rest upon.

The theory of the process of using the porous cup in making up an electroplating solution is in the peculiar fact that, although the electric current passes freely through the walls of the cup, the metal itself will not penetrate it. In this manner it is possible to maintain one kind of solution in the stone crock and another in the porous cup without danger of mixing them. This principle is one well known to physics and use is made of it in the familiar Grove or Bunsen galvanic batteries, and those who have used them will appreciate how the porous cup allows the use of nitric acid in it without danger of contaminating the sulphuric acid in the outer jar, and at the same time the current passes freely through the walls of the cup.

Making 14 Karat Gold Solution.

As the porous cup method is particularly applicable to the making of gold solutions the process of producing them will be taken as the example and a description of it given. Karat gold solutions, usually more difficult to make than those in which pure gold is used, are made up equally as easy. Let it be assumed, therefore, that a 14 Karat gold solution is to be made. The method is as follows:

A 14 Karat gold anode is necessary and it should be in the form of ribbon so as to present a good surface to the action of the solution. A copper wire is fastened to one end of it. The porous cup and the stone crock are the other materials required. These are shown in Figs. 1 and 2. For the cathode to be used inside of the porous cup, a piece of copper wire, sheet copper or brass or other metal may be used. It is not attacked and will not contaminate the solution. A carbon from a dry battery is an excellent cathode and one is used in the illustrations. It is easily obtained from an old dry battery and the connection is already fastened to it. Its use is not essential, however, and a piece of metal may be used. The carbon is preferred as it is easily obtained and there is no possible chance of contamination. To be sure, there is no danger of contamination when a sheet of brass or copper is used as the cathode, unless the current is stopped and then only in the porous cup. If the carbon is used, the solution in the porous cup may be poured into the main solution after the operation of making it has been finished. As this feature preserves the balance of the solution, the carbon is to be recommended.

For the solution to be used in the stone crock, potassium cyanide is dissolved in water in the following proportions:

Water	1 gallon
Potassium Cyanide	3 oz.

The cyanide is dissolved in the water and is ready for use. The solution may be used either warm or cold. When warm, the gold anode dissolves more readily, but as the operation requires no attention, the cold solution gives all that is necessary.

The quantity of gold necessary for making up the 14 karat gold solution depends upon the desire of the operator. It is customary to use 1 oz. of gold to the gallon when the solution is to be used *cold* for the electrodeposition of the gold, but if to be used hot a much less quantity can be taken—from 2 to 5 pennyweights to the gallon. It is surprising, however, how little gold can be used.

even in a cold solution and obtain a good gold deposit. The plater can, therefore, use a less quantity of gold than the 1 oz. to the gallon and yet have a solution that will give a gold deposit. For the example let it be assumed that 1 oz. of gold is obtained in the form of ribbon and is to be used in making up the *cold* gold solution.

Starting the Current

To begin, the cyanide solution previously made by dissolving 3 oz. of cyanide in 1 gallon of water is poured into both the stone-crock and the porous cup. The carbon is inserted in the porous cup and connected by a copper wire to the cathode rod (that used for connecting work to be plated). The gold anode is placed in the solution in the stone-crock and connected by a wire to the anode rod. The method of arranging the different parts and connecting them is shown in Fig. 2. The current may now be turned on and allowed to act until the operation is finished.

Strength of the Current.

While a strong current would naturally seem to hasten the operation, it is not advisable for the reason that the anode coats over with a slime and the passage of the current is thus impeded. From 4 to 5 volts may be used for a time, but after half or three-quarters of an hour a green slime is found on the anode which somewhat impedes the action, but if the current is stopped for a short time, it soon dissolves. It is better, therefore, particularly when no attention is required, to use a weaker current of from 2 to 3 volts and give it plenty of time. In four or five hours the anode will be found dissolved down to a thin leaf. When this has taken place it is advisable to turn the anode over so that the portion previously outside of the stone-crock may be used. Care should be taken not to allow the copper wire to come in contact with the solution or this also will dissolve and contaminate it.

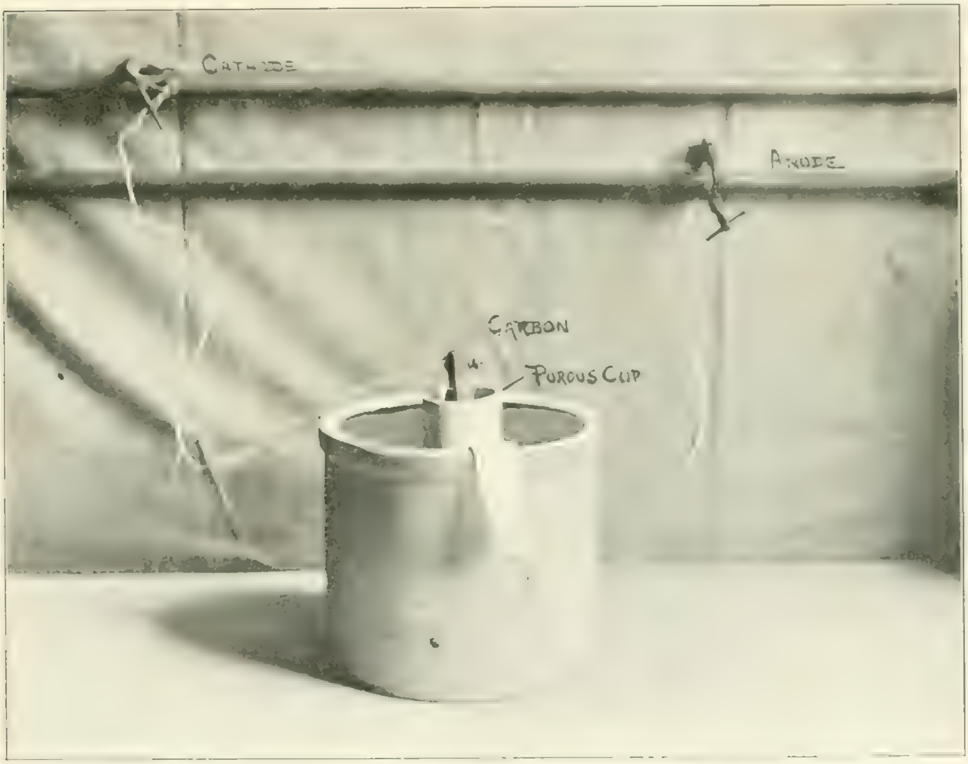


Fig. 2. The Solution in Active Operation and Illustrating the Method of Connecting the Anode and Cathode.

After the anode has either partially or wholly dissolved, as may be desired, the solution is ready for use. The liquid in the porous cup will have become unchanged in color, while that in the stone-crock will be yellow from the dissolved gold. The solution in the porous cup, in case a carbon anode has been used, is poured into that in the stone-crock; but if copper or brass has been employed in it, it is preferable to throw it away.

After the porous cup and the gold anode have been removed, the solution is completed and is ready for plating. The quantity of the anode dissolved may be ascertained by weighing it before and after and the difference represents the quantity of gold that has entered the plating solution. This feature is of advantage when a certain amount of gold is to be dissolved from an anode too large. By first weighing it and then allowing the action of the current to go on until, upon weighing again, the desired weight has been removed.

Silver, copper, brass or bronze solutions may be made in the same manner as the gold, but unless a small one is to be used, the process is quite slow. Owing to the fact that no foreign salts at all are introduced into the solution, it will readily be appreciated that a plating bath made in this manner contains nothing but the metal dissolved in cyanide. If desired, bi-sulphite of soda or other addition may be made after the metal has been drawn from the anode without affecting the solution at all.

The ease with which a plating solution may be made in this manner and the quality of it particularly commend it. Were it not so time-consuming, it would undoubtedly be used extensively on all kinds of work. Its use, however, is now confined almost exclusively to the making of small gold solutions, but it is equally as applicable to other metals.

If a dip silvering solution gives a yellow-colored silver deposit it signifies that too much cyanide is present.

Solutions for dip gilding are not extensively employed as it is usually considered more advantageous to electrodeposit the gold. Equally as small an amount of gold can be put on. Dip gilding, however, is quite applicable to the gilding of pins, screws and similar small brass goods that must be done in baskets.

Electrodeposition of Metals from their Solution in Acetone.

Various experiments have been carried out in the past in the endeavor to deposit metals from solutions other than those containing water. The object has been to avoid the action of the metal upon the water and prevent the secondary reaction which takes place when the metal is deposited. For example, sodium cannot be deposited from a solution of a sodium salt in water as it decomposes it as rapidly as it deposits. With other liquids, however, such a reaction may not take place.

In a paper read before the *American Electrochemical Society* at the Niagara Falls meeting, June 6-8, Harrison E. Patten and Wm. R. Mott described their experiments upon the electrodeposition of metals from their solution in acetone.

They were able to deposit arsenic from its chloride solution in acetone; and bismuth, antimony, tin, copper, cadmium and iron were also obtained as electrodeposits in the same manner by the use of solutions of their chlorides in acetone. Sodium and strontium were likewise deposited but in this instance the iodides were used. High current densities were employed and note is made of the fact that in the case of copper, 90 amperes per square foot were used in a still solution without the deposit becoming crystalline. In fact, it was smooth. If this high current density were used in an aqueous acid copper solution, the deposit would become "burnt." In the case of sodium and strontium about 180 amperes per square foot were used and with iron the same. In the case of copper a less quantity—90 amperes per square foot—was employed.

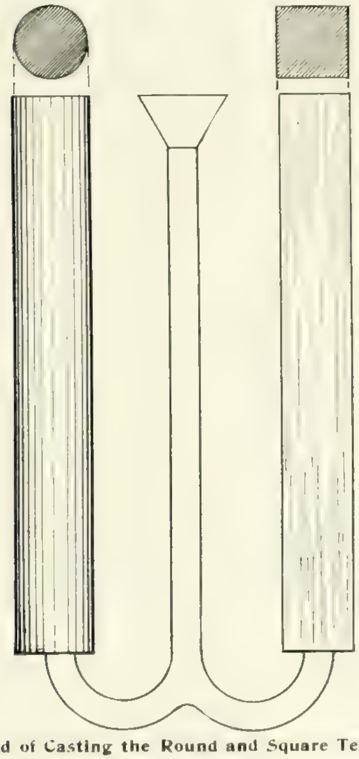
Hot gold solutions require much less gold than cold ones and should be used whenever possible as the deposit is better. The temperature of the solution determines the color. The hotter the solution the redder the gold deposit.

For oxidizing silver for the production of the French-gray finish, liver of sulphur is the material now extensively employed. It is easily used and cheap, and when well done, the results are excellent. It requires a rather heavy silver deposit in order to avoid cutting through when relieved.

Perplexing Differences in the Tensile Strength of Round and Square Test-Bars.

By A. Gustersen.

While there are many difficulties constantly arising in the casting of test-bars and which result in the lowering of tensile strength, they can usually be explained by some fault in the mixture, pouring temperature or method of casting. I have recently had some experience in casting both round and square test-bars which is perplexing and which I have not been able to explain. In every case, the square bar showed a much higher tensile strength than that of the round bar.



Method of Casting the Round and Square Test-Bars with One Gate.

Both the square and the round bars were cast out of the same pot of metal and in the same mold. They were both attached to the same runner as herewith illustrated. The metal which entered the test bars, therefore, was of exactly the same composition. Were the bars cast from different melts or in different molds, there might be an explanation of the difference; but as each bar were attached to the same runner and poured from the same pot of metal and at the same time, one would naturally believe that both bars would show the same tensile strength. While it is apparent that a square bar has the larger surface exposed to the sand and thus chills more rapidly, it hardly explains the difference as the exposed surface in the square bar is not enough greater than that of the round one to produce the large difference in the tensile strength.

The round test-bar pattern was 14 inches long and 1 7/16 inches in diameter. After it was cast, this round bar was turned down in the center to 1.028 inches, which is equivalent to 0.830 square inches sectional area. As previously mentioned, both bars were cast upright at the same time and from the same runner. The square bar was 14 inches long and 1 x 1 inch. After it was cast, the sides were carefully filed to 0.930 inches, which gives 0.865 square inches sectional area. The following tests will illustrate the difference in the tensile strength between the round and square bars

88-10-2 *Mixture.*

The following mixture was used for making this test:

Scrap Copper Clippings......	88 lbs.
Tin	10 lbs.
Zinc	2 lbs.

The melting was done in a Rockwell oil-burning furnace with 11 oz. air pressure and 30 lbs. oil pressure. The results obtained on the test-bars are as follows

Round Bar.....	28,795 lbs. per sq. in.
Square Bar.....	37,410 lbs per sq. in.

Vanadium-Bronze Mixture.

This mixture was composed of practically the same proportions as the preceding one with the exception of the addition of cupro-vanadium:

Copper	88 lbs.
Tin	10 lbs.
Zinc	2 lbs.
Cupro Vanadium .	3 oz

The following results were obtained on the test-bars

Round Bar	[illegible]1,686 lbs. per sq. in.
Square Bar	33,543 lbs. per sq. in.

This mixture was melted in the Rockwell furnace in the same manner as the previous test

Scrap Melt

The gates from the 88-10-2 melt in the first test were re-melted, but in this case a No. 60 crucible was used. A furnace with natural draft was employed. Hard coal was used for the fuel and the draft was poor. The mixture (when new) of the scrap was as follows

Copper	88 lbs.
Tin	10 lbs.
Zinc	2 lbs.

The following are the results obtained when the bars were tested

Round Bar	19,698 lbs. per sq. in.
Square Bar	32,150 lbs. per sq. in.

Manganese-Bronze.

Ingot metal was used and 2 lbs. of zinc were added to 100 lbs. of the ingots to compensate for the loss. Both specimens of the test bars were slightly oxidized. The results obtained are:

Round Bar	21,686 lbs. per sq. in.
Square Bar	54,057 lbs. per sq. in.

Composition Scrap

Scrap composition was re-melted in a crucible and poured into test-bars. Two square bars were cast. The first was poured "hot" and then the metal allowed to cool down somewhat, after which a second bar was poured. The following tests were obtained

Square Bar Poured "Hot"	35,550 lbs. per sq. in
Elongation	1 in. in 5 in.
Square Bar Poured "Cold"	25,080 lbs. per sq. in
Elongation	7/16 in. in 5 in.

The bar poured "cold" showed oxidation at the fracture.

The great difference in the tensile strength of the round and the square bars should be noted. As more uniform conditions could not be obtained in casting, the reason for the discrepancy is perplexing. I should like the opinion of the readers of this article on the subject and any experience will be welcomed.

A Satisfactory Modeling-Wax.

The following modeling-wax, the invention of one of the most expert modelers in the metal trade, has given the greatest satisfaction wherever used. It is highly recommended and will be found to give all that is desired

White Beeswax	1 lb.
Diachylum	1 oz.

Diachylum is a substance used in the pharmaceutical trade. It is made by heating olive-oil with red-lead until a soft substance is formed. This substance is plastic but not sticky. The object is to reduce the granular structure of the beeswax and toughen it.

The beeswax and diachylum are melted together and colored red with a mixture of equal parts of crocus and rouge. About 1 oz. of the mixture is added to 5 lbs. of the melted beeswax and diachylum. When this has been done and the mass thoroughly mixed, it is poured out on a piece of marble or metal and allowed to cool. It is then broken up and remelted. The remelting improves it.

While crocus and rouge are chemically the same, one is softer than the other. Crocus is the harder. It is added to allow free cutting and it serves to keep the tools in good condition. The rouge is used to color the mass as it is advantageous to have the modeling-wax of a color other than white.

The trolley-wheels which give the longest life are now made free from lead as it has been found that the more of this metal they contain the more rapid the wear.

There are very few instances in the manufacture of yellow brass castings in which a small quantity of aluminum cannot be used to an excellent advantage. It promotes soundness and prevents pin-holes. While yellow brass containing it is more "drossy" than that free from it, an alteration of the gate and runner will overcome this difficulty. A large number of manufacturers of yellow brass castings are now using aluminum in their metal. Saddlery-hardware makers, automobile trimming manufacturers, makers of cabinet and general hardware, and many other similar manufacturers have found it excellent. Brass to be used in plumbers' brass goods or other articles to stand pressure should not contain it, however, or they will leak

Electrogalvanizing Previous to Silver-Plating in the Manufacture of Cheap Wares and in Re-Plating Flat Ware.

By Alfred Martin.

As it is possible to obtain a heavy and smooth deposit of zinc by the use of a suitable electroplating solution, the employment of this metal in the manufacture of certain kinds of silver-plated ware, particularly those of steel, offers much advantage. To produce a heavy silver deposit is costly and only the best grade of work will warrant it. If copper is employed for giving the article a heavy deposit previous to silver-plating, it is unsatisfactory for the reason that as soon as the silver begins to wear off, the copper shows through and becomes conspicuous. By the use of electrogalvanizing, however, it is possible to obtain a thick, smooth deposit over the steel surface upon which the silver may be deposited, so that when it wears through nothing but the white color of the zinc is exposed. At the same time, the steel is protected against rust in a manner not possible to obtain by other means. The protection offered by the zinc is brought about by the fact that, owing to the difference in the electrical properties of zinc and steel, the zinc corrodes in preference to the steel and no rust follows. The value of galvanizing as a protection of iron or steel against rust is now well known and extensively used.

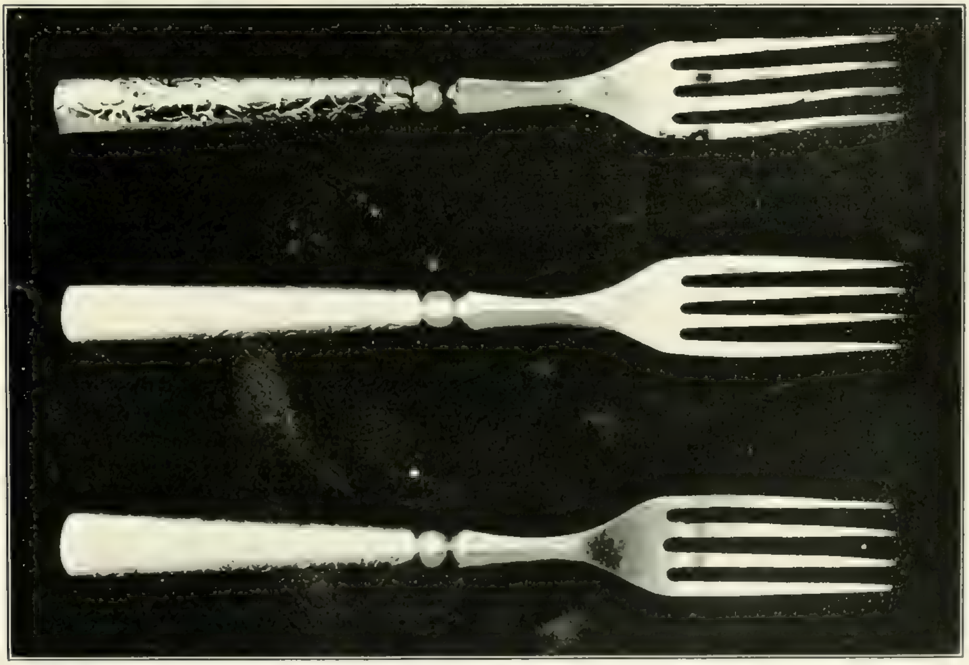


Illustration Showing Various Stages of Replating Steel Forks.
Top Figure Shows the Fork with Silver Worn Off. Middle Figure Illustrates the Electrogalvanized Fork.
Bottom Figure is the Silvered and Finished Fork.

For some time I have used the foregoing method for refinishing silver-plated knives and forks, spoons and hollow ware. I have found it to be particularly efficacious in refinishing wares of this description which have been used in hotels and restaurants, as they are usually in a worse condition than any other goods of a similar nature. For several years I have employed the process with the best of satisfaction. It is possible, when the method is properly carried out, to make a first-class job with very little silver and with the accompanying low cost.

The usual method practiced in refinishing old steel knives and forks is first to grind out the scratches and pits with emery. Then cut down with tripoli and they are ready for the first strike. The first strike is nearly all cyanide with very little silver. After this has been done, they are passed through the second strike, which contains a little less cyanide and more silver than the first one. After coming from the second strike, the knives and forks are transferred to the regular silver solution and the necessary silver deposit put on. After scratch-brushing and burnishing they are finished. As this method of refinishing such goods is costly, it brings the price of the work close to that of new wares. If the reader, therefore, will closely follow the succeeding directions, he will neither have to cut the work down with emery nor perform the extra labor upon the goods that is necessary by the usual method. A first-class job will be produced with very little silver. I have been using the method for several years without the slightest trouble. The method is as follows:

If time can be spared it is preferable to strip the work. It usually takes about 15 minutes to do this. The knives and forks are first potashed to remove the grease on them and then stripped by means of the following solution:

Water	1 gallon
Cyanide	[illegible] lb.
Caustic Potash	½ lb.

The knives or forks are made the anode in this solution and a steel plate used for the cathode. From 4 to 6 volts should be used in this stripping operation. In about 15 minutes or less all the silver will be removed and the steel left unharmed.

When the goods come from the stripping solution they are scoured with a wet tampico wheel and pumice until bright. They are then wired up and run through the potash again. Next dip into a cyanide dip and after rinsing they should *immediately* be transferred, without allowing to dry, to the electro-galvanizing solution.

The electrogalvanizing solution is made as follows:

Water	1 gallon
Sulphate of Zinc	2 lbs.
Sulphate of Aluminum	2 oz.

This solution is used cold. Use pure zinc anodes and plenty of them. The goods are run in this solution for about 15 minutes. From 1 to 3 volts are used in plating.

After the zinc deposit has been put on in this solution, the goods are taken out and rinsed. They are then thoroughly scratch-brushed on a *steel* wire wheel.

The next step is to dip into the so-called "quickening" or mercury dip. This dip is made as follows:

Water	1 gallon
Cyanide	2 oz.
Yellow Oxide of Mercury	⅛ oz.

After coming from this dip, it will be noticed that the mercury has permeated the zinc to such an extent that it has the appearance of pure silver. The presence of the mercury on the zinc surface before silvering renders the silver deposit adherent and allows the deposition to take place evenly. It also prevents the oxidation of the zinc before it goes to the silver solution.

I usually plate the goods in the silver solution about 10 minutes. Then scratch-brush and buff. It is surprising how long the silver deposit will keep its color on the zinc coating without tarnishing. The goods thus produced are rust-proof on account of the presence of the zinc as previously mentioned. This feature is important in the use of hotel-ware as it frequently wears through the silver and rusts when plated in the usual manner with a light silver deposit.

The value of the zinc deposit produced by electrogalvanizing the goods lies in the fact that it fills the scratches and pits so that when the surface is scratch-brushed on the steel-wheel, a uniform surface is produced for the silvering. In addition to this, the zinc deposit is white so that it does not become conspicuous when the silver wears off.

The presence of a small quantity of iron in an electrodeposit of nickel serves to slightly whiten it, and as all commercial nickel anodes contain iron, it may be said with certainty that nearly all commercial nickel deposits contain a small amount of iron.

Blowholes in castings rarely come from wet sand, or from air entangled in pouring. Blowholes from such causes are usually very large. Overheating the metal in melting or allowing it to remain too long in the furnace after it has melted, are the principal reasons for the presence of blowholes.

Electrodeposition of Zinc and Lead as Affected by Addition of Organic Substances.

In a paper read before the *American Electrochemical Society* at the Niagara Falls meeting, May 6-8, Prof. S. A. Tucker and E. G. Thomssen, of Columbia University, describe some experiments that were made to determine the effect of glucosides upon the character of zinc and lead deposits. The introduction of glucosides into solutions used for the electrodeposition of metals has been patented by Classen (U. S. Patent, 809,492, Jan. 9, 1909), and the experiments were undertaken to determine the effect on zinc and lead deposits as embodied in the patent. As a cheap and satisfactory glucoside, Classen recommends *licorice-root or extract* and the investigations were carried out by the addition of these substances. It was found, however, that the addition of licorice root did not give as good results as the addition of the extract.

Effect on Zinc Deposits.

While the bath recommended by Classen consisting of 1,000 parts of water; 200 parts of zinc sulphate; 40 parts of sodium sulphate; 10 parts of zinc chloride; 5 parts of boracic acid; and 50 parts of licorice root gave good results, it was found that equally as good results could be obtained from the use of zinc sulphate alone with the addition of licorice extract.

The effect of the licorice on the zinc deposit was to render it quite smooth, and if the surface upon which it was deposited was also smooth, the deposit had a polished appearance. In all cases it was bright.

A singular phenomenon was found. The zinc deposit produced from a zinc sulphate solution containing licorice extract, was of greater quantity than the theoretical amount, showing that the zinc contained some substance other than pure metal. The authors state that the increase in the weight over the theoretical quantity is caused by entrained organic matter from the licorice. It was found that the zinc deposit contained from 0.2 per cent. up to 4.0 per cent. of organic matter. With a new bath the percentage is low, but when it becomes old the quantity of organic matter deposited is large. The 4.0 per cent. of organic matter obtained by the authors in one experiment was produced from an old solution.

After using a solution of this character for the deposition of zinc for some time, the zinc deposit became quite poor at the end of several hours. When scraped, however, it was seen that the first layer was good while the last became poorer and poorer until it no longer adhered. That this was due to the solution and not the cathode was found by using a new cathode when the same poor deposit was obtained. It was then discovered that a further addition of licorice root restored the original condition, and a good zinc deposit was produced. It is apparent, therefore, that the production of the imperfect deposit was caused by the exhaustion of the licorice from the solution.

The use of rotating cathodes was tried and it was found that not only was it possible to use a current density of over 90 times that of the "still" solution, but the deposit was also improved. The quantity of organic matter carried over was about the same in this as in other instances where a "still" solution was employed.

Effect on Lead Deposits.

Lead is a very difficult metal to deposit in a thick and coherent condition. As soon as the deposit reaches any degree of thickness it becomes spongy. When licorice is added to a solution of the nitrate or acetate of lead, the deposit becomes smooth and adherent. The lead deposited in a bright and firmly adherent condition. As in the case of zinc, it was found that a certain amount of organic matter was carried over and deposited with the lead. This ranged from 0.2 per cent. up to 6.0 per cent. When the lead solution had been used for some time, it was found that the quantity of organic matter deposited with the lead was much greater than in the case of a fresh solution.

Conclusion.

In both the zinc and lead solutions it was found that the addition of the licorice root increased the resistance of the solution considerably, but it decreased again after using for some time. The resistance of the zinc solution was much less than that of the lead.

Good deposits were obtained from both the lead acetate and lead nitrate solutions when licorice was added. From 0.5 to 1 volt was used and from 0.2 to 0.5 amperes per sq. dcm.

In the case of zinc, from 0.3 to 0.6 volt was used and from 0.4 to 0.5 amperes per sq. dcm.

The quantity of licorice extract added was from 1 to 3 per cent. or practically from 1 to 3 oz. to a gallon of solution.

Stripping Gold from Brass or Copper.

The stripping of gold from brass or copper articles is not an easy operation and should not be undertaken unless absolutely necessary. The difficulty lies in the fact that the gold is dissolved only by aqua-regia and rather slowly. As soon as the film of gold is removed, however, the aqua-regia begins to act violently upon the brass or copper and pits it. In stripping metals, there is always the difficulty that some portions of the article to be stripped have a heavier deposit than others. This is true of exposed portions. The parts which contain the least gold become stripped first, leaving the base metal exposed to the action of the acid before the heavy deposit on the other portions are removed. This means that the base metal is apt to be attacked and pitted before all the gold is taken off.

While stripping gold from brass or copper is not a perfectly satisfactory operation, the method recommended and used by Roseleur is practically the only one that can be used with results approaching certainty. Iron or steel articles, of course, are easily stripped by making them the anode in a cyanide solution and "backing" the gold off by means of the electric current It is not satisfactory for stripping gold from brass or copper. Roseleur's method is as follows. Make up this solution:

Oil of Vitrol............	2½	gallons.
Aqua Fortis	1	quart.
Muriatic Acid	2	quarts.

The aqua fortis and muriatic acid are mixed and the oil of vitrol poured into the mixture. The whole is stirred and allowed to cool when it is ready for use.

The articles to be stripped are first cleaned from grease and then immersed in the acid where they are allowed to remain until the gold is removed. This may be ascertained by plunging the articles, after the gold appears to have been removed, into the ordinary bright acid dip composed of the following

Oil of Vitrol	1 gallon
Aqua Fortis . .	1 gallon

Immersion in this dip will give a bright, uniform surface. When the articles are immersed in the gold stripping dip, they assume a uniform blackish-gray coating. This dissolves in the bright dip when the articles are immersed in it.

The stripping solution is practically a weak aqua-regia dip and acts slowly upon the gold so that the base metal is not violently attacked even though it may be exposed. This solution, however, is suited only for stripping articles which have a thin deposit of gold such as that produced in ordinary gold electroplating.

Sulphide of Antimony for Barbedienne Finishes.

Many persons experience difficulty in producing the well-known "Barbedienne" finishes by means of sulphide of antimony and the quality of this substance is frequently the cause. Two kinds are known to commerce:

1. "Kermes Mineral." This is an oxy-sulphide of antimony possessing a red color, but in the form of small scales. While it occurs in nature, the majority of it is now made artificially, although of the same composition as the natural material. Kermes mineral is used in the manufacture of fireworks, matches, in medicine, and in the making of red rubber.

2. The "Golden Sulphuret" or antimony sulphide, precipitated. This is made by precipitating a solution of antimony chloride by means of hydrogen sulphide gas It forms a red finely divided substance.

The "Kermes Mineral" is unsuited for the production of the Barbedienne finishes on account of the difficult solubility. Although it can be used by finely powdering it, the results are not as good as those obtained by the precipitated sulphide.

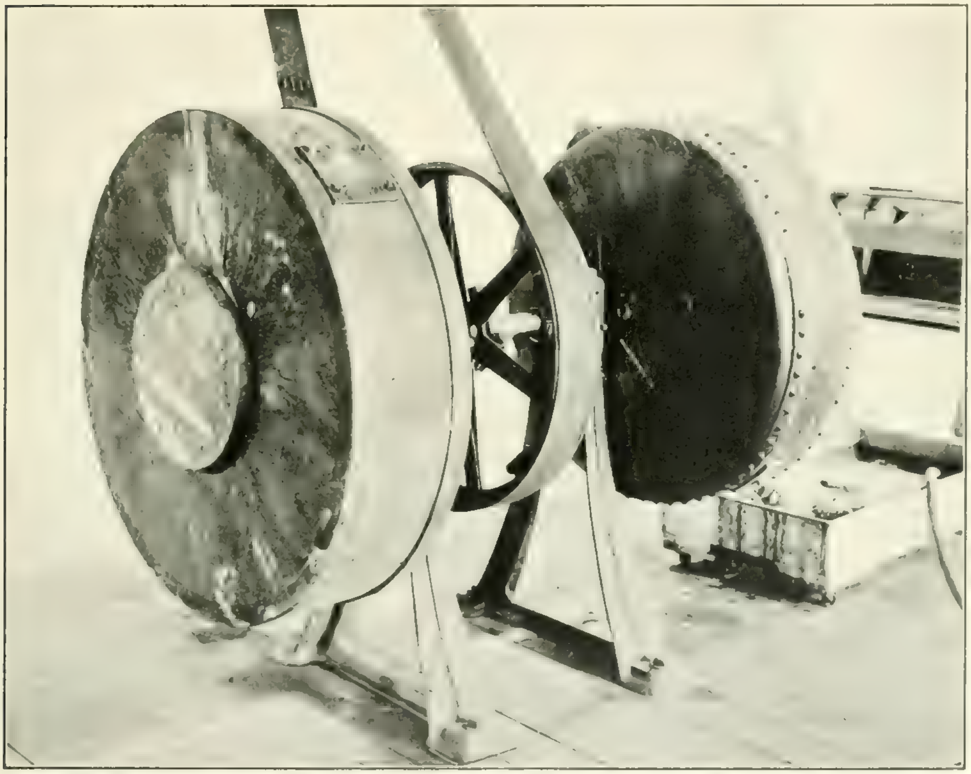
The precipitated antimony sulphide or "Golden Sulphuret" is the better material for the purpose as it is very finely divided and may be dissolved with ease. Those who have difficulty with the production of the Barbedienne finish, should ascertain that this is the substance which they use

Tumbling Barrel of New Principle for Burnishing Work by Steel Balls.

Now that steel balls are coming into extensive use for burnishing small metal goods by tumbling, a tumbling barrel suitable for the work is necessary. Much of the previous adverse experience in steel ball tumbling has been brought about by the use of barrels unsuited for the work.

Geo. E. Abbott, of the Abbott Ball Co., of Hartford, Conn., who has made a study of steel ball burnishing, recently investigated the matter of tumbling with steel balls and came to the conclusion that, while the tumbling barrels in general use for steel ball tumbling are adapted for other classes of work, they do not give the rapid and satisfactory burnishing that is necessary when used for such work. With this idea in view, he has constructed a tumbling barrel upon an entirely new principle and which has been in use for some time with the best of results. Goods may be burnished in it by means of steel balls more rapidly and more efficaciously than in the regular form of tumbling barrel.

The tumbling barrel is herewith shown and its construction is quite simple. Two barrels are attached to a shaft driven by a pulley. The one at the right made of sheet steel is intended for cutting down the work previous to tumbling with the steel balls as this is frequently necessary in some classes of work. This barrel may be replaced by a duplicate of one on the left, if desired, in case the work to be tumbled requires no previous cutting down. Both the steel and the wood barrels, however, are constructed upon the same principle.



The Abbott Tumbling Barrels for Use in Tumbling Work with Steel Balls for Burnishing Them.

At the left, the barrel used for burnishing with the steel balls is illustrated. It is 30 inches inside diameter, 7 inches wide inside and made of $1\frac{3}{4}$ in. oak. Two iron hoops around the outside serve to hold the whole together firmly. There is a hole in the side 10 inches in diameter with a wood cover bolted on. A pipe is screwed in the center of the cover (not shown in the illustration) which acts as a safety valve and prevents the accumulation of pressure in the barrel during the tumbling.

A hole in the periphery of the barrel is covered with a plug and cap, which are held in place by thumb nuts. This hole is used to empty the barrel. The hole in the side is used for filling, as it serves better for this purpose. The barrel is mounted in such a manner that, when the tumbling is completed, a box or other receptacle may be placed under it and the cap removed allowing the balls and work to fall into it. At the right of the illustration a box resting upon castors is shown. This may easily be rolled under the barrel. The burnishing compound is then washed out with a hose and nothing but the balls and work left.

The barrel has been constructed with the idea that the work will become more rapidly burnished if a long space is had for the balls to pass over the work. In this form the balls come in contact with work and slide over it for a long distance. At the same time, there is no impact, like that which takes place in some forms of barrels. Impact dents rather than burnishes the work. It is the sliding of the balls upon the work that serves to burnish it. It is this sliding principle, free from impact, that has been the aim of the inventor. The barrel will be placed upon the market in the near future and will unquestionably act in a very beneficial manner in increasing the use of steel balls in tumbling.

Yellow Brass Mixture for Making Plumbers' Brass Goods.

For high steam pressure, yellow brass does not give good results and cannot be used. It leaks and becomes brittle at such a point, and is not sufficiently non-corrosive for some kinds of work. A red metal, therefore, is necessary for such work. For plumbers' brass goods, such as faucets and cocks or similar work, yellow brass can be used to a good advantage in spite of opinions to the contrary, and is much cheaper than red metals. Some manufacturers maintain that although a yellow brass mixture is cheaper than a red one, the castings made from it are practically no cheaper than those made from red metal on account of the greater percentage of loss; but this has not been found true in practice and evidently has been brought about by the use of a poor mixture.

A yellow brass mixture for making plumbers' brass goods should not contain too much spelter or the castings will contain dross and leak. The following one has been found very satisfactory for such work and is extensively used:

Copper	70 lbs.
Zinc	25 lbs.
Lead	3 lbs.
Tin	2 lbs.

The tin is necessary for producing the desired stiffness and hardness, and the lead will impart the free cutting qualities required in brass to be worked on automatic tools. Care should be taken not to exceed the quantity of lead given.

The preceding mixture will give hard, strong castings and will cast soundly and run freely.

A Glaze for Commutators.

The commutator of a dynamo or motor gives better results and wears less rapidly if it can be made to glaze over. As it is necessary in electroplating dynamos to use copper brushes, it is more difficult to glaze the commutator than when carbon brushes are employed. Owing to the low conductivity of carbon, they would have to be made much larger than those of copper to carry the same current.

The following composition has been found excellent for glazing the commutators of electroplating dynamos: Dissolve 4 oz. of caustic potash in 1 pint of water and then boil and add 1 oz. of flowers of sulphur. Boil until the sulphur is wholly or partially dissolved making a yellow colored solution. Then add lard oil and boil until a soap is made. Cool and add a mixture of equal parts of flowers of sulphur and graphite (very fine or that known as electrotypers' graphite) until a thick paste is produced. This is applied to the commutator, but very little is needed to produce the desired results.

Some Experiments on Nickel Plating with Different Solutions.[*]

A number of very interesting experiments have been made by Edward F. Kern, of the Metallurgical Laboratory of the School of Mines, Columbia University, New York City, and which are herewith given in abstract. The salts selected for investigation were as follows:

1. Nickel Sulphate.
2. Nickel Chloride.
3. Nickel Fluo-Silicate.
4. Nickel Fluo-Borate.

These nickel compounds were selected because of their higher solubility and cheapness.

Nickel Sulphate (Single Salts).

A solution of nickel sulphate was used containing 8 per cent. of nickel and was made by dissolving the equivalent, 38.25 grams of crystallized nickel sulphate, in 100 c. c. water.

Neutral.—The gasing at the anodes and cathodes was slight, but increased, as the voltage of the current increased. Insoluble basic salts formed upon the cathode as the deposition progressed which rendered the nickel deposit brittle and caused it to split. The basic salts could not be removed by washing with water. There were also considerable basic salts in the bottom of the solution. A current of from 10 to 20 amperes per sq. foot was used and temperatures from 20 to 60 degrees C. employed. From ½ to 1 volt was used. In both the hot and cold solutions the deposit was the same. Mixed with basic salts and brittle and split. It was assumed, therefore, that the neutral single salt is unsuited for the deposition.

Double Nickel and Sodium Sulphate.—This salt was used to ascertain if the sodium sulphate had any beneficial effect on the deposition. The solution was made up by dissolving 38.25 grams of nickel sulphate (single salts) and 21.94 grams of sodium sulphate in 100 c.c. water. This gives an equivalent of 8 grams of nickel and 3.14 grams of sodium in the 100 c.c. of water.

The addition of the sodium sulphate had the effect of increasing the conductivity, especially when the solution was heated to 60 degrees C. The deposit from the heated solution was very satisfactory. It was smooth, solid, white and free from cracks. The current efficiency approximated 100 per cent.

At 20 degrees C., or the ordinary temperature, the deposit was dark, although solid, and was attached to the plate as a number of small curls. The efficiency of the deposition from the solution at 20 degrees C. was quite low, due to considerable gasing at the electrodes, as the result of the high voltage. The voltage required at 20 degrees C. was 3.12, while at 60 degrees C. only 0.96 was used. These voltages were required to give a current density of 20 amperes per square foot.

It was assumed, therefore, that the addition of the sodium sulphate is not of advantage unless the solution is heated.

Nickel Sulphate with Free Acid.—In these experiments free sulphuric acid was added to a solution of nickel sulphate containing the equivalent of 8 grams of nickel in 100 c.c. of water (38.25 grams of crystallized nickel sulphate). Both 1/10 and ½ molecular equivalent of free sulphuric acid was used. For the ½ molecular equivalent of acid, 3.5 c.c. of sulphuric acid (sp. gr. 1.84) was added to 100 c.c. of the solution, and for the 1/10 equivalent, 0.70 c.c. was used.

During the electrodeposition the free acid caused the current density to become high, owing to the increased conductivity produced by the sulphuric acid. With the larger quantity of sulphuric acid the voltage, therefore, to produce the desired current density of 10 amperes per square foot was less than with the smaller amount. Gasing took place freely at the cathode, but none at the anode.

The deposit in the case of the larger quantity of acid was unsatisfactory, while that of the smaller amount was better. The current density in each case was 10 amperes per square foot. The solutions were heated and the deposit was improved. In the hot solutions there was much less gasing than in the cold ones. The temperature of 20 degrees C. (ordinary temperature) required in the ½ molecular equivalent of sulphuric acid, 0.40 volts at 20 degrees, 0.30 volts at 40 degrees, and 0.21 volts at 60 degrees to give the desired current density of 10 amperes per square foot.

Nickel Fluo-Silicate Solution.

This solution gave very satisfactory deposits. It was made up by adding a calculated amount of black oxide of nickel to hydrofluosilicic acid containing 39 per cent. of pure acid. A clear blue solution was obtained. It was diluted so as to contain 8 grams of nickel in 100 c.c. and the right amount of hydrofluoric to make the neutral salt.

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[*] Abstracts of a paper read before the American Electrochemical Society at the Niagara Falls Meeting, June 6-8, 1909.

The deposition was carried on with a current density of 15 amperes per square foot and from 1.10 to 1.18 volts with a temperature ranging from 40 to 55 degrees F. During the deposition some gelatinous silica separated out, but did no harm as it settled to the bottom of the tank. The corrosion of the anodes was very even, the impurities in it (the carbon, iron and copper) remaining as an adherent sludge which retained the original form of the anode.

The nickel deposit from the fluosilicate solution was bright, perfectly smooth, flexible and free from apparent crystallization. A deposit 3/16 of an inch in thickness was obtained.

Nickel Fluoborate Solution

The nickel fluoborate solution was made by first adding a calculated amount of boric (boracic acid) to a 40 per cent. hydrofluoric acid solution. To this solution was added nickel carbonate until neutral and contained 8 per cent. of metallic nickel. The deposition was conducted with a current of 15 amperes per square foot and at from 1.10 to 1.25 volts. It was found that temperatures of from 40 to 60 degrees F. produced a light green insoluble salt in the solution which interfered, so that one of 30 degrees C. or below was employed.

The deposit was quite satisfactory and was bright, smooth, malleable and adherent. It attained a thickness of 5/16 of an inch. It was not quite as satisfactory as the deposit from the fluosilicate solution, however, as it was not as smooth, but was more nodular, especially at the edges.

Nickel Chloride

Both the nickel chloride and the double nickel and sodium chloride were used. In some of the cases the solutions were neutral, and in others, free acid was present.

Neutral Nickel Chloride.—In depositing the solution, a basic salt formed which did not interfere with the quality of the nickel deposit. The deposit at 20 degrees C. cracked at the last of the run and curled up, bending towards the anode. The deposits at 40 and 60 degrees C. showed no tendency to peel.

Acid Nickel Chloride.—In one instance a solution was made containing 32.40 grams of nickel chloride, equivalent to 8 grams of nickel in 100 c.c. and 2.2 c.c. hydrochloric acid, sp. gr. 1.20 per 100 c.c. In the other the same quantity of nickel chloride was used but with 11 c.c. of hydrochloric acid.

Gasing occurred freely at the cathode, but none at the anode. The deposits in both solutions were not satisfactory, and the one with the most acid gave the worst results. A current density of 10 amperes per square foot was used, and the voltage with the large amount of acid was 0.49 at 20 degrees C., 0.36 at 40 degrees and 0.21 at 60 degrees, showing that the temperature increased the conductivity. These figures are for the solution containing the greater amount of acid.

For the one with the less amount of acid, a current of 10 amperes per square foot was used and the following voltages were found necessary in order to maintain this density: At 20 degrees, 0.73, at 40 degrees 0.52, and at 60 degrees, 0.35.

Double Nickel and Sodium Chloride.—This solution contained 32.40 grams of crystallized nickel chloride and 8 grams of sodium chloride in 100 c.c., giving 8 grams of metallic nickel in the quantity of water.

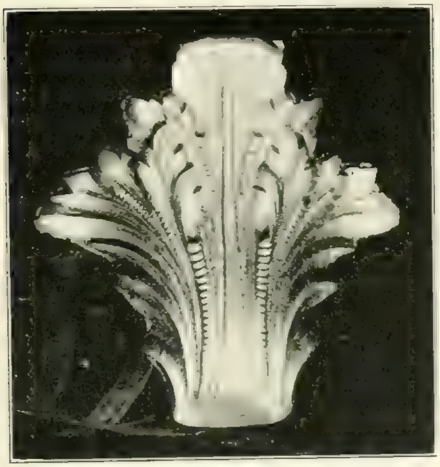
The presence of the sodium chloride in the cold nickel chloride solution was not found very beneficial, although it had no injurious effect. In the heated solution, however, as will be noticed by the following results, it is advantageous in that it increases the conductivity. A current density of 20 amperes per square foot was used. At 20 degrees C. 1.02 volts were necessary to maintain the current density, and at 60 degrees, 0.58 volts, so that the heating of the double chloride solution is beneficial. The deposits were good and smooth.

With the exception of amber, copal is the hardest of all the known gums.

An alloy of 90 per cent. platinum and 10 per cent. iridium was used by the Parisian Commission for making the standard metric weights and measures. It is extremely hard, as elastic as steel and is absolutely unaltered upon exposure to the air.

A Good White-Metal Pattern Mixture.

A good white-metal pattern mixture must melt readily, cast with exceeding sharpness, and not be too expensive. While bismuth is frequently added to white-metal pattern mixtures to lower the melting point, not only is it expensive, but it is apt to lower the melting point to such a degree that soldering is difficult. It is really unnecessary. A manufacturer sends us the following white metal pattern mixture and comments on it:



White Metal Pattern Cast of the Pattern Mixture.

Editor:

The mixture we use for making white-metal patterns is very close to the one frequently employed containing bismuth, but is free from it and is not expensive. When properly mixed and poured it gives excellent results. After making over fifty experiments we concluded that the following mixture is the best for our purpose. We send you a casting made from it:

Tin	7 lbs.
Lead	[illegible] lbs.
Antimony	[illegible] lbs.

J. H. W. Co.

(The foregoing mixture is an excellent one and has given everything desired in our hands. We doubt whether it can be improved upon for general white-metal pattern work.—*Editor.*)

Tantalum and its Applications.

One of the most interesting of the so-called rare metals is tantalum. Unlike most of these metals, it possesses sufficient malleability to allow rolling into sheet or drawing into wire. In Germany it is extensively used as the filament in incandescent electric lamps, although in the United States tungsten is employed for this purpose. We are indebted to the *Ironmonger* for the following description of the properties of tantalum:

A paper on "Tantalum and its Industrial Applications" was read by Mr. Alexander Siemens before the Royal Institution on April 23. The lecturer stated that when the electric light was first introduced, in 1878, it was thought that the doom of gas lighting was sealed, but, in consequence of the improvements introduced in methods of gas lighting, such as the regenerative burner and the incandescent mantle, this anticipation was not realized. Indeed, the development of gas as a competitor compelled electrical engineers to seek for means of cheapening their illuminant, and provide substitutes for the carbon filament. One great drawback of carbon in electric lighting was that the bulk of the current was consumed in the production of heat rather than light, even the arc-lamp utilizing only about 1 per cent of the total current as light, and this defect attached to all methods of lighting devised by man. Another weak point about carbon was that when the temperature of the filament exceeded 1,600 degrees C., or thereabouts, disintegration set in. To overcome this inconvenience, Nernst devised a filament composed of refractory earths, but as these were conductive only when heated, the provision of the requisite heating appliances complicated the construction of the lamp. The osmium lamp was the next improvement, but the filaments of this metal were brittle, and the actual supply available for use was very small, the annual production of the metal being only about 8 kilos, of which 5 kilos were required for medical purposes. Other metals proposed for use in electric lamps were [illegible]dium and niobium, but the first of these was incapable of standing a higher temperature than carbon, and even the [illegible] though it would stand temperatures up to 1,900 degrees C., had a tendency to soften at disintegrate considerably below the melting-point.

Tantalum, as a material for filaments, was first introduced by Dr. von Bolton and Dr. Feuerlein, of Berlin. Having an atomic weight of 181, it could be rolled into ribbon and filaments, being tough and malleable, like steel. Moissan, who determined the specific gravity as 12.8, stated that it was non-conducting and brittle, which peculiarity was due to the specimens prepared by him containing about 0.5 per cent. of carbon, which affected the physical properties considerably. The chief sources of tantalum ores are Scandinavia, North America, and West Australia. Of these ores, the best is tantalite (Western Australia), containing 40 to 70 per cent. of tantalum pentoxide, with iron and manganese. By reducing the double fluoride of tantalum and potassium with metallic potassium, the metal was obtained as a black powder, which was compressed by hydraulic power into cylindrical discs, these being melted into buttons by exposure to the heat of the electric arc *in vacuo*. Since the metal was first produced on a commercial scale in 1905, the manufacturing process had been improved.

Experiments on the specific heat of tantalum were made by Sir J. Dewar, who found the average to be 0.033 between 100 degrees and 0 degrees C., 0.032 at —78 degrees C., and 0.028 at between —78 degrees and —183 degrees C.

In point of heat conductivity—as was shown by an experiment in which wires were partly immersed in liquid air, and the relative dimensions of snow caps were shown by projection on a screen—tantalum had only about three-fourths the conductivity of iron, and one-eighth that of copper. At ordinary temperatures tantalum was not attacked by any reagent except fluorine, and was therefore an ideal metal for apparatus exposed to conditions favoring rust. It was malleable, and could be drawn out to wire 3/100 mm. in diameter. Elastic, and possessing a tensile strength of 57 tons per square inch, an ordinary lamp filament would support a weight of 2.8 oz. The sheet metal could be stamped, and the bar metal converted into springs, specimens of which were exhibited by the lecturer. Tantalum was also used for making pen nibs, in the same way as steel pens. At first the pens would not pass the ordinary test (in which a paper ribbon 10 kilometres in length was drawn under and in contact with the pen point), but wore away too quickly. It was found, however, that slight oxidation reduced the wear under this test to 0.8 milligramme; and furthermore that the rate of wear was uniform, as if the oxide had penetrated into the metal. This behavior also afforded an explanation of the alleged "hardness" of tantalum.

Another use for tantalum might be for making cataract knives for oculists, these having to be of very hard metal, so as to obtain a sharp edge, besides being tough and unbending, capable of sterilization, and not subject to corrosion. For this and similar purposes, tantalum was equal to steel, but was too expensive. Dental instruments also constituted a field of utility for tantalum.

At a dull red heat tantalum absorbed hydrogen and nitrogen and became brittle. When heated in the air it changed color like steel, turning first yellow, then blue, and finally burning, the white pentoxide being formed. The melting-pot, *in vacuo*, was 2,250 degrees to 2,300 degrees C.; the specific weight 16.6, the specific resistance 0.165, and the temperature coefficient 0.3 per cent. between 0 degree and 100 degrees C. Experiments in Messrs. Siemens and Halske's laboratory gave the specific resistance as 0.173 to 0.178, changing to 0.147 after prolonged heating, the temperature coefficient being determined as 0.33 per cent.

The most important application of tantalum was as a filament for glow lamps, for which purpose it was first used in 1903, the first lamps giving a light of 3½ candles, with a consumption of 1.5 watts per candle. Owing to the circumstance that the tantalum film softened when heated, it had to be supported by copper holders mounted on a glass stem, the 650 mm. of filament being wound in a zigzag form. With filament 1/20 mm. in diameter, 1 kilo. of tantalum was sufficient for 45,000 lamps; but at present an even thinner filament (1/30 mm.) was used. In prolonged use, the filament underwent alteration with a loss of tensile strength, and in about 1,000 hours capillary contraction was observed, the longitudinal section becoming undulated. This contraction accounted for the fact that the several limbs of the filament were seen to have become tight on the holders, instead of hanging loosely as at first.

Tantalum, however, resisted over-heating better than carbon filaments, the latter breaking first when the voltage was raised beyond 110 volts, when lamps consuming 1.5 watts per candle-power at 110 volts were compared. As regards the consumption of electrical energy, tantalum was superior to carbon, this being demonstrated by an experiment in which two lamps were immersed in water, that containing the carbon lamp becoming much hotter than that with the tantalum lamp. In point of amperage, that of the tantalum lamp was 0.35, as compared with 0.7 for the carbon lamp. When both lamps were coupled up in the same circuit, the same current passing through them, the tantalum lamp gave the better light.

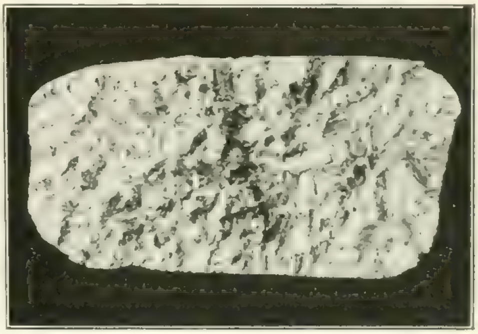
When a tantalum filament was heated in a vacuum, oxygen was expelled, the dark spots at first seen on filaments contaminated by oxide disappearing under the influence of a high-tension alternating current. If platinum and tantalum electrodes were immersed in an electrolyte and the current was passed through the tantalum as a positive pole, a deposit of oxide formed on the tantalum electrode and the passage of the current was stopped. This could be shown by the extinction of a lamp included in the circuit. On reversing the current, the full lighting power of the lamp was restored; and when an alternating current was used, the lamp glowed with only half the normal brightness. When the advantages of tantalum were fully appreciated, and its limitations recognized, a wide field of industrial application would be open to it.

Iron in Aluminum Chips.

Now that aluminum is so extensively used a corresponding quantity of chips is produced and are used for making aluminum ingot. While such ingot is unsuited for making high-grade aluminum castings, it can be used for making second quality of work, or by adding it in small amounts to new metal. The oxidation of the aluminum when melted in the form of chips is, of course, the cause of this difficulty.

While the use of aluminum chips for making ingot metal cannot be highly recommended, it is frequently necessary on account of the quantity which accumulates. When they are used, however, care must be taken that they are free from iron or steel chips or much trouble will be caused. It is a difficult matter in machine shops to keep chips separate. Although a lathe, planer or drill press may be carefully cleaned previous to machining aluminum, there are always some crevices which hold back iron or steel chips and which finally contaminate the aluminum. Then, too, pieces of twist drills, tools, screws, etc., fall into them so that it is unsafe to take the word of the producer of the chips that "they are free from iron."

The color of iron or steel chips is so near that of the aluminum that it is difficult to distinguish them when mixed. When aluminum chips containing iron are melted, there is formed an alloy of aluminum and iron and the quantity of iron that enters depends upon the heat used. As a usual rule, nearly all of the iron alloys with the aluminum.



Fracture of An Alloy of 92 Per Cent. Aluminum and 8 Per Cent. Iron

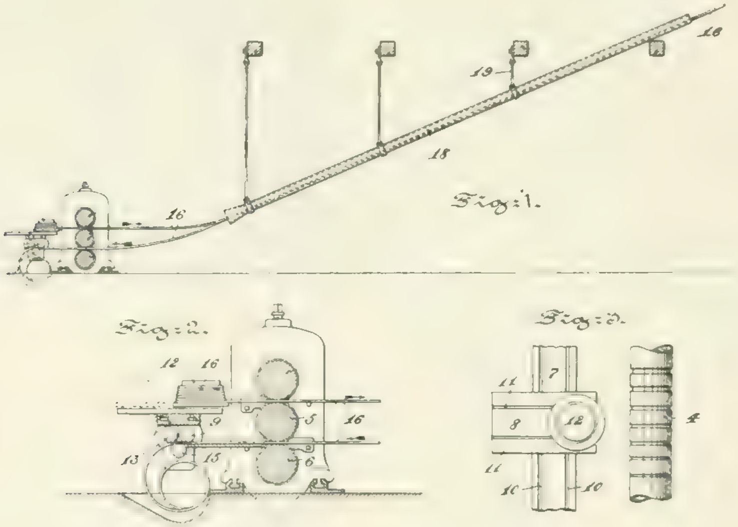
Many founders have wondered why aluminum made from chips should be so hard and brittle, although the metal, from which the chips were cut, was tough. The contamination with the iron is the cause. When this is the case, the aluminum becomes thick and pasty when melted, and the fracture is short and coarse-grained. The metal is also hard. In the illustration herewith shown, the photograph of the fracture of an alloy of 92 per cent of aluminum and 8 per cent of iron is shown. The crystalline fracture of the metal should be noticed. While this quantity of iron is more than would usually be obtained from the contamination of aluminum chips by iron, it will serve to indicate the effect.

If the aluminum chips after melting are thick and pasty and the metal when cast hard and brittle with a coarse fracture, it indicates that iron is present. The remedy, of course, is to put the chips through a good magnet machine.

A New Mill for Rolling Brass Rods.

A new rod mill for rolling brass, copper or other metal rods has been patented by Hugh L. Thompson, of Waterbury, Conn., the well-known rolling mill engineer. The object of the mill is to provide improved means for supporting and guiding the rod as it passes through the rolls, and for coiling the rod after the rolling operation has been completed.

The rod, in the form of a coil, is placed upon the drum 12, in the position indicated by dotted lines in Fig. 2. The end of the rod is straightened from the coil to the length of four or five feet. The drum 12 is then moved into the position shown in solid lines in Fig. 2, to facilitate the operator in introducing the end of the rod between rolls 4 and 5, in the direction of the arrow. As the rod passes through the rolls 4 and 5, it is introduced into the trough or channel 18, which inclines upwardly from approximately the horizontal plane passing between rolls 4 and 5. The rod is forced upwardly in the trough or channel 18, until it entirely passes from between rolls 4 and 5. It is now in a most convenient position for the operator to introduce the rear end of the rod 16 back between the rolls 5 and 6 for the further reduction of the same. It will be noted that gravity assists the operator in introducing the rear end of the rod between the under pair of rolls and it also assists in feeding the rod thereto. As the rod passes from between rolls 5 and 6 it passes between the elements 13, 14 and 15 of the inverted coiler forming said rod into a coil beneath the coiler elements and beneath the drum supporting table into the pit 17. It will be seen that the coiler is extremely close to the rolls, and entirely beneath the drum supporting table, so that a minimum area of factory floor space is occupied.



Thompson's New Machine for Rolling Brass Rods.

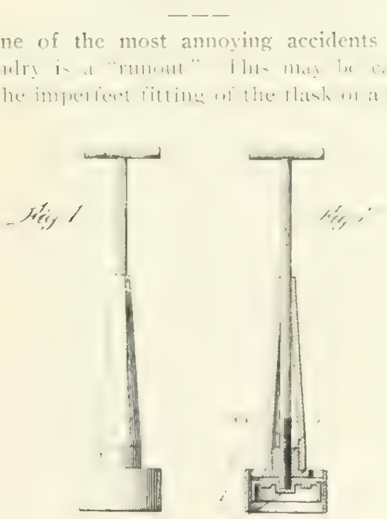
A Use for Tellurium.

As far as known there has never been any use for the metal tellurium. It is one of the so called "rare" elements, although only so in name, for it is quite widely distributed and occurs associated with gold and silver ores as well as other metals. At one time an attempt was made by the Baltimore Copper Works to save the tellurium that constantly accumulated in the slimes of their electrolytic copper refinery, and quite a quantity was produced. No use was found for it, however, and the practice of reclaiming it appears to have been abandoned.

Tellurium is a metal resembling arsenic in its properties and one might say, "on the ragged edge" of a non-metallic element because it is brittle and possesses only a slight metallic lustre. A new use, and probably the first one, has been found for tellurium. John T. H. Dempster, of the General Electric Co., of Schenectady, N. Y., has patented (U. S. Patent 923,152, June 1, 1909), an alloy of silicon and tellurium containing from 1 to 15 per cent. of tellurium. The alloy is adapted, the inventor says, for use as a resistance material in lightning arresters, heating units, etc. The silicon and tellurium may be melted together in a crucible, or covered with calcium carbonate which is decomposed by the silicon and forms silica. The calcium oxide then unites with the silica forming calcium silicate which acts as a slag. This is the method preferred. The inventor states that 5 per cent. of tellurium is the best mixture and that it increases the resistance of the silicon from 3 to 5 times without making it brittle or imparting undesirable properties to it.

A Tool for Stopping Run-Outs in Sand Molds.

One of the most annoying accidents in a foundry is a "runout." This may be caused by the imperfect fitting of the flask or a number of other causes. A tool for stopping such a "run-out" has been patented by Edward W. Conarton, of Jersey City, N. J. (U. S. Patent 924,740, June 15, 1909).



Tool for Stopping Run-Outs.

The invention comprises an open-end cup-shaped member having a tubular handle or stem projecting rearwardly from it and a piston mounted upon the end of an operating rod or bar which passes through and is threaded in the wall of the cup-shaped member. The tool is adapted to have a charge of sand or loam packed into the cup-shaped member against the piston and be pressed directly over the run-out or break in the mold. While held firmly in this position, the operating rod or bar is rotated for forcing the piston forward in the cup-shaped member to crowd the sand or loam against the break in the mold. The tool is held in place over the break in the mold until the outer surface of the metal of the run-out is sufficiently chilled to stop it.

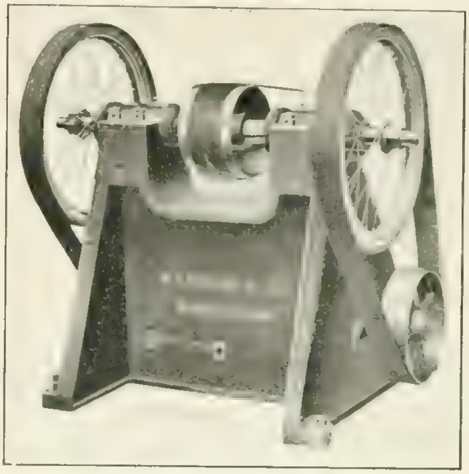
Electric Cleaning and Depositing in the Same Solution.

The use of one solution for electric cleaning metals before plating and at the same time allowing the deposition of metal to take place has ben patented by Alfred Levy, of Paris, France (U. S. Patent, 923,894, June 8, 1909). No specific solution is given, but the use of caustic soda with cyanide is mentioned. An anode of the same metal that is to be deposited is employed, and the work to be plated is immersed in the solution as the cathode. When the solution is drawn from the anode, as it must be in this case, it is only after some time that enough metal is removed from the anode to produce a metallic deposit. If desired, some salt of the metal may be added to the solution. As the solution contains but little metal and an excess of alkali and cyanide, the metal deposits very slowly and ample time is had for the cleaning of the metal to be plated by the escape of gas from its surface.

(We fail to find anything new in this patent. This method of cleaning has long been in use in the silver plating industry, particularly in the electroplating of steel knives upon which two strikes are employed. The first is very low in metal and high in cyanide, and when used much gas is given off and the silver deposits very slowly. While the knives are cleaned in this [illegible] before they enter this strike the [illegible] grease could be dispensed with [illegible] as the evolution of gas would remove it. Owing to the contamination of the solution, however, it is not advisable. [illegible])

A Pneumatic-Wheel Polishing Machine.

A new and unique pneumatic polishing machine has recently been constructed by W. Canning & Co., 133 Great Hampton St., Birmingham, England, and is now manufactured and sold by them. Its novelty lies in the use of pneumatic, rubber-tire wheels over which an endless belt, coated with abrasive, runs. The machine is herewith illustrated.



Cannings' Pneumatic Wheel Polishing Machine.

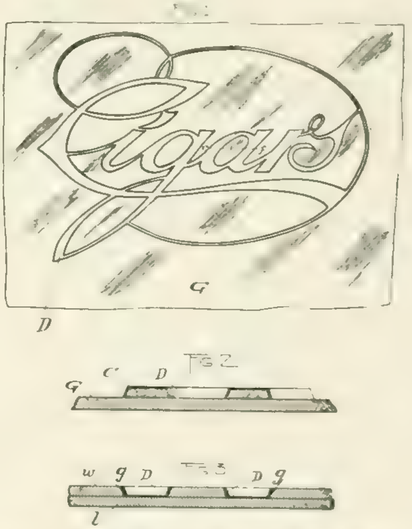
It will be noticed that the machine consists of a rigid stand upon which a shaft driven by a pulley is situated. At each end of this shaft a pneumatic tire wheel, similar to those used on a bicycle, is fastened. Over the rubber tire an endless belt travels and is connected to an idler pulley at the bottom of the stand. The idler pulley is movable so that the belt may be made tight or slack. This belt is of the ordinary strapping-belt type and has emery or other abrasive glued to the surface.

The machine is *not* used as a strapping belt as it would first appear, but instead, the work to be polished is applied directly to the face of the pneumatic wheel and ground or polished as though a regular polishing wheel were used.

The advantage of the machines is in the fact that the soft, rubber tire acts as a cushion for the work and prevents any "bumping" or vibration which so frequently occurs when an ordinary wooden wheel wears out of true. The flexibility of the rubber tire allows even a greater latitude than can be obtained by the usual leather-covered wood wheel. In addition to the great flexibility of the wheel and its freedom from wearing out of true, is the fact that, owing to the strong character of the rubber tired wheels, a much greater speed may be used in polishing than would be safe with a wood wheel.

Making Metal Letters by Electrodeposition.

A new process of making metal letters for use on signs has been patented by Fritz A. Walter, of Rochester, N. Y. (U. S. Patent, 924,020, June 8, 1909). The method consists in taking a sheet of metal, preferably lead, and coating it with a layer of wax of the thickness of the letters to be made. The letters are then cut out or traced, by means of suitable tool, down to the lead plate. The sides of the wax in the letter design are then coated with fine graphite and the whole placed in an acid copper solution and copper deposited upon the plate. The deposit forms only upon the letter design, and when it has become of sufficient thickness, the whole is removed and is finished by buffing or other treatment as may be desired. The plate and wax are easily removed from the copper deposit



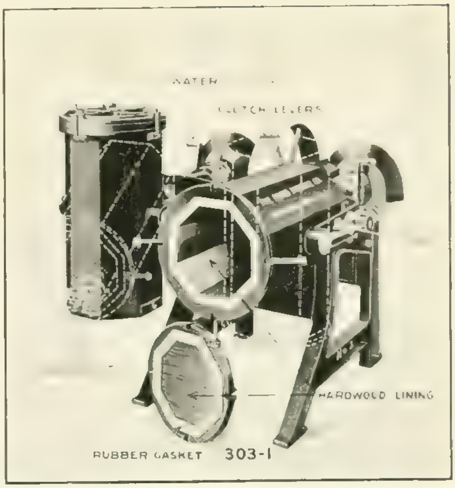
Method of Making Letters by Electrodeposition.

Fig. 2 shows in sectional view a portion of the sign, as for instance, the letter "a" taken along the line e-f of Fig. 1. Fig 3 shows a section of the sign after its formation by electrodeposition upon the plate and wax. In Fig. 1 the finished sign is illustrated.

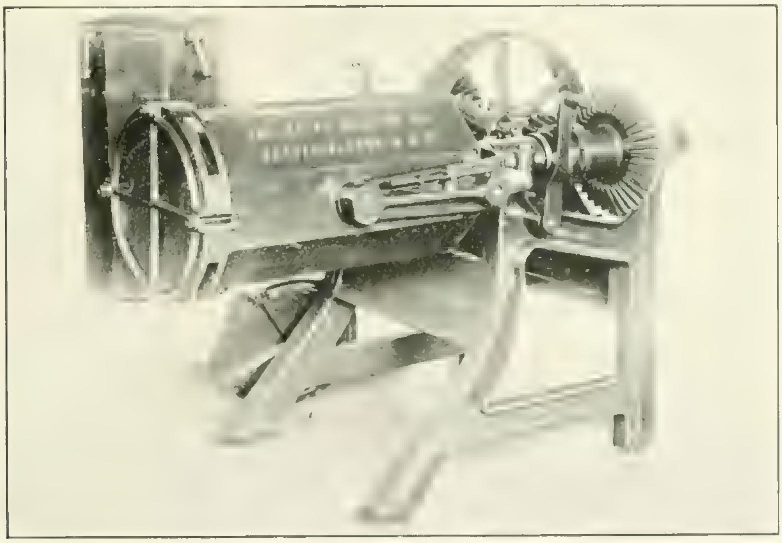
The New "Baird" Tumbling Barrel for Tumbling with Steel Balls.

The Baird Machine Co., of Oakville, Conn., the well-known manufacturers of tumbling barrels, have placed a new tumbling barrel on the market designed particularly for tumbling small metal goods with steel balls. The barrel is herewith illustrated.

The machine consists of two barrels which may be run together or independently. They are pivoted near the center and are held in the forked shaped bearing by a lock pin. A slight push on the lock-pin lever, instantly disengages the pin when the barrel can be tilted. The cover is removed by loosening the nuts and then throwing back the hinged bolts.



Detail of "Baird" Tumbling Barrel for Use with Steel Balls.



The New "Baird" Tumbling Barrel for Use in Burnishing Work with Steel Balls.

The barrels are made of cast-iron lined with hard maple which prevents any abrasion of the work. When the wood wears out it is easily replaced with new material. When the barrel is filled or is to be emptied, it is tilted and raised or lowered as shown in the illustration. When this is done it disengages the gear and ceases to revolve. The barrel cover is supplied with a rubber gasket which renders it water-tight.

Many varieties of small metal goods, in the form of sheet, wire and castings, are now burnished by tumbling them with steel balls. Some of the articles are electrical goods, typewriter and adding-machine parts, buckles, hose-supporter and corset trimmings, buttons, cabinet hardware, purse and bag ornaments, collar-buttons, chains, jewelry, pins, rings, and many similar kinds of goods.

Heretofore, there has been no tumbling

barrel made especially for tumbling work with steel balls, and the one previously described will fill a long-felt want in the trade.

Regenerating Old Nickel Solutions by Sulphate of Nickel.

It is safe to say that a small proportion of establishments in which nickel plating is carried on, use a sufficient number of anodes in their solutions. Nickel is not as readily dissolved from the anodes in plating and particularly if coated over, so that in order to allow as free replenishing of the solution with nickel as possible, plenty of anodes should be employed. There cannot be too many.

In instances where an insufficient number of anodes are used, the nickel is soon drawn from the solution and is not replenished from the anodes as it should be. The solution, therefore, becomes deficient in nickel and high in sulphate of ammonia.

In such instances resort is had to sulphate of nickel (single salts). They can be added in considerable quantity without danger as an excess will not dissolve. The best method is to take out some of the solution and add the single salts to it. Usually an ounce or two to the gallon is all that is required, so that if 100 gallons of solution are had then from 15 to 25 pounds of single salts are needed. They are dissolved in the solution by heating, or in water if desired, and added to the nickel tank. Under no condition should they be added directly to the solution without previously dissolving as they will then settle down to the bottom of the tank.

When the single salts dissolved in the solution or in water are introduced in the nickel solution, it should be thoroughly stirred to mix the contents and then allowed to settle before using. For this reason it is advisable to add the single salts on Saturday, after the work has been completed, so as to give the solution an opportunity to settle over Sunday.

The need of single salts is usually indicated by the slowness of the deposition and the pitting of the work.

Plaster of Paris is an excellent flux for use in melting scrap brass, such as washings, grindings, etc. It melts at a red heat and dissolves the foreign matter in the metal, and at the same time does not attack the crucible.

A Method of Casting Safe Knobs.

A new method of casting knobs for use on safes has recently been invented and patented by Wm. F. Bansmith of the Victor Safe and Lock Co. of Cincinnati, Ohio. The usual method of making a knob used for the combination lock of a safe is to cast the knob and plate separately, but in the method herewith described, the two are cast together as a solid piece of metal.

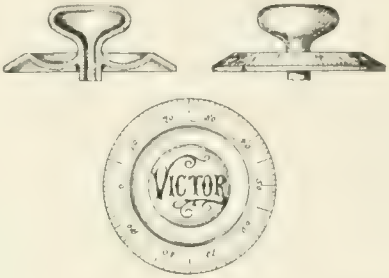


Fig. 1. The Safe Knob that is to be Cast

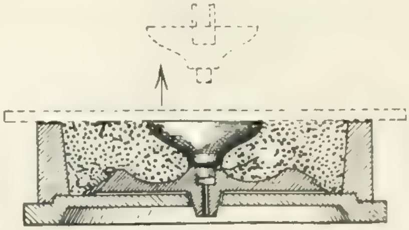


Fig. 2. Core-Box and Core.

In Fig. 1 is shown the front, side and cross-sectional view of the knob to be cast. The first step is to make a core for inserting in the mold. In Fig. 2 the core box and core are shown and in Fig. 3 another view of it is given. The core-box, it will be noticed, has both bottom and top plates. On the bottom, the dial plate is formed, while on the top the knob is produced. The box is rammed up as shown in Fig. 3 and the knob portion P is then taken out. The box is then turned over so that it has the appearance in Fig. 2. The dial plate is then taken out and the core is left finished. The completed core has the appearance shown in Fig. 4.

To mold the safe knob, a match plate is used like that in Fig. 5. The top side only is shown. When rammed up in the sand it has the appearance illustrated in Fig. 6. The pattern plate is then removed and the prints

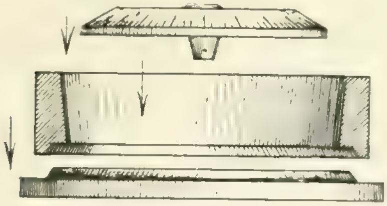


Fig. 3. Another View of Core Box.

K leave the sand so that the cores may be inserted. The core shown in Fig. 4 is now inserted in the mold in K (see Fig. 6) and the

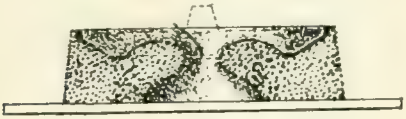


Fig. 4. The Finished Core.

mold, therefore, when completed has the appearance shown in Fig. 7. The gating is done on top of the knob as illustrated. The core does not make the complete knob and the remainder is formed by the match plate so that it comes in the cope.

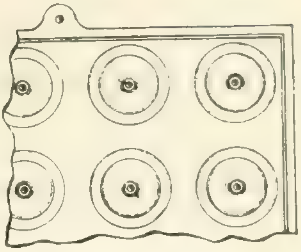


Fig. 5. The Match Plate.

low. When this has been done the cope is closed and the mold is ready for pouring. Safe knobs are usually cast of good, red bronze.

Common-salt is very extensively used in the brass rolling mill industry in melting brass. It is used as a flux and its function is to remove the oxide of copper formed in melting and not as a covering to protect the metal after it has melted. It is really a "chemical" rather than a "mechanical" flux. If brass founders would use it more extensively better castings would result.

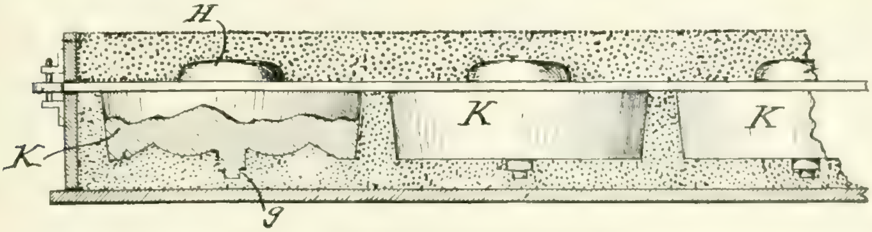


Fig. 6. The Mold with the Core Inserted.

Burgundy pitch is obtained from the Norway spruce tree. It resembles common rosin but melts more easily and has a lighter color.

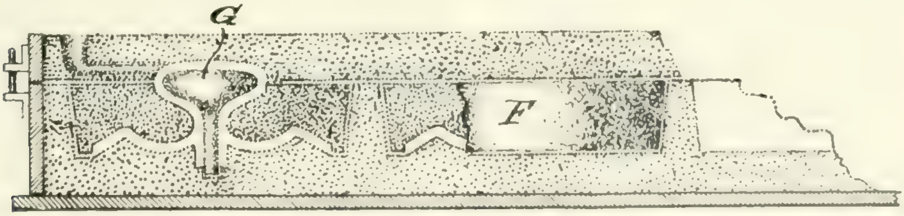


Fig. 7. The Mold with the Cores Set and Gate Cut Ready for Casting.

As the knobs are always cast hollow to save weight, it is necessary to insert the G to finish the mold and allow the casting to be hol

It becomes very sticky when warm and although easily broken when cold [illegible] soon [illegible] into a solid mass again.

Questions and Answers.

Question No. 656. Are there any brass mixtures, red or yellow, which take nickel plate better than others?

Answer. One brass mixture will take nickel deposits as well as another and while, theoretically, red metals should receive a deposit more rapidly than yellow ones on account of the greater electrical conductivity, the difference is so slight as to be inappreciable.

Question No. 657. What causes scabs on the surface of a gun metal casting? This weighs about 300 lbs. and we have cast several and they would be practically perfect were it not for the scabs. We have tried different heats and methods of pouring without success.

Answer. Scabs on green sand castings are caused by the use of too wet sand or ramming it too hard without properly venting it. As the majority of molders know the danger of having sand too wet, it is usually the case that the mold has not been vented sufficiently. The scabs are caused by steam blowing the metal back from the side. When this is done, the metal partially cools so that it does not unite. The scab, then, is similar to a "Coldshot."

Question No. 658. We understand that fumes from an electric cleaner in which cyanide is used are injurious to the operator. Is this correct? If it is, is there a solution which can be used for electric cleaning that contains no cyanide?

Answer. When an electric cleaner is used, a fine mist or spray is constantly thrown up from the surface, and even with a good exhaust fan, the operator cannot avoid inhaling more or less of it. When no fan is used, however, the operator is exposed to such an extent that cyanide poisoning is very apt to follow. Modern practice has practically eliminated electric cleaners which contain cyanide on account of their danger, and instead those which contain substances of a harmless nature are employed. The following is an excellent electric cleaner:

Water	1 gallon
Caustic Soda	2 lbs
Sal Soda	2 lbs.

This cleaner should be used with a current of from 10 to 12 volts if possible as the cleaning is then rapid and thorough. Use it hot.

Question No. 659. What is the reason that metal, after it has been poured into a mold, will rise in the gate as if it had yeast in it? I have had trouble with both yellow and red brass and phosphor bronze. When the castings are machined, the surface is spongy. Would ferro-manganese overcome it? The rising starts in the top of the gate right away after the metal has set.

Answer. The cause of the metal rising in the gate is that it has been overheated during the melting or allowed to "soak" in the fire. In either instance, the metal absorbs gases which are expelled at the moment it sets in the mold. If you are careful not to overheat the metal during the melting operation, or to allow it to "soak" after it is melted, you will not be bothered by its rising in the mold. Ferro-maganese will not aid you at all.

Question No. 660. How can brass buckles that have been dead-dipped be dried without staining? If I use sawdust, the surface of the brass is scratched and if dried out in hot water, stains are left on the surface.

Answer. It is customary to lacquer dead-dipped articles, such as brass buckles, without drying. The so-called "water-lacquer" is employed. This is a regular lacquer but the work is dipped into it without drying. The water is removed and settles to the bottom, and is drawn off from time to time. The lacquer is made especially for the purpose. By its use, the drying of the work is avoided and the surface is not stained.

Question No. 661. What is the most economical and cheapest form of yellow brass scrap that can be purchased for general use?

Answer. If you desire the most economical form, you should purchase yellow brass ingot from a reputable maker (not one who melts down anything that is scrap) as your melting loss will be less and the ingot can be purchased at a very reasonable price. The leading makers of yellow brass ingot now make it from brass chips as this material is practically the only one which can be safely used for making good metal. Light brass, washings or other forms of an uncertain nature are not free from iron and are not considered good materials for making ingots. Of course, you can purchase the chips and melt them, but unless you are a large purchaser and one who is in the market at all times, you will probably find it difficult to purchase them of the right quality and at a satisfactory price. Yellow brass chips which have been passed through a good magnet machine are the best material for making ingot.

Question No. 662. In attempting to burnish gold plated work the burnisher scratches the surface. I have tried soap water and also alcohol but without success. Why should the burnisher scratch the gold?

Answer. Your burnisher is undoubtedly in bad condition. The surface is probably not smooth enough. In order to burnish metals the working portion of a burnisher must have a mirror surface. It is customary, whenever possible, to use a blood-stone burnisher for burnishing gold as it gives a better surface than a steel one. You should use a good burnishing soap made for the purpose

QUESTION No. 663. Will you publish a receipt for Swiss bell-metal with the quantities of the ingredients in it?

Answer. We do not know that there is any particular mixture used in Switzerland for making bells, other than that employed in other countries. A good bell metal consists of the following:

Copper	4 lbs.
Tin	1 lb.

If, in melting, a flux of yellow prussiate of potash is used, a small quantity of iron is introduced into the mixture, which greatly improves the tone. The bell metal is covered with it for a short time while melting and allowed to remain on until ready to pour. Use no zinc or lead in the bell metal or the tone will suffer.

QUESTION No. 664. Will it be possible for me to learn to analyze samples of brass, bronze babbitt, and other alloys without taking a full course in chemistry? I am 37 years of age and would have to learn it evenings.

Answer. We doubt whether you will be able to make much headway in the analysis of the metals and alloys you mention without some personal instruction and a knowledge of chemistry. The best method is to serve for as long a time as possible in a chemical laboratory where this work is done. Not only is a knowledge of chemistry required, but experience in manipulation that is necessary for success.

QUESTION No. 665. What is the cheapest method of etching? We desire to make some goods of steel and with a name etched on them.

Answer. The cheapest and most rapid method for etching is known as the "Rubber-Stamp Process" which was described in THE BRASS WORLD for February 1908. All steel knives are etched by this method.

QUESTION No. 666. Is there any method by which holes and imperfections in brass castings can be stopped up so that they can be plated without the holes showing? Something like a cement would do.

Answer. No cement of any kind would answer as the metal would not deposit over it. The only manner in which the holes can be stopped is by soldering, and even with this method you will probably experience some difficulty as the imperfections are frequently not metal but dross, and the solder will not adhere to them. You have a difficult problem and the best solution is to make good castings.

QUESTION No. 667. I should like to know what ingredients to use to color yellow brass and bronze a mahogany finish and how to use it? I have tried liver of sulphur and find it makes the metal too black.

Answer. Liver of sulphur is used for this purpose and the reason that you have obtained too black a color is that you have used it too strong. Use from ⅛ to ¼ oz. of liver of sulphur to 1 gallon of water and employ it cold. As soon as the desired shade has been produced, remove the work from the solution rinse well and dry. If the surface is now scratch-brushed with a dry, brass scratch brush, the desired shade will be produced. In this manner you can produce red, mahogany, chocolate and black colors on copper or bronze. Yellow brass is best copper plated first. On bronze without copper plating, the color is brown and is much used.

QUESTION No. 668. We wish some information in regard to melting scrap nickel, such as used for making hot tubes for gas engines. We wish to remelt this and cast into plates.

Answer. You will have to melt your scrap nickel in crucibles and if you have nothing but an ordinary brass foundry furnace using natural draught, we fear you will not succeed in melting it unless you use a blast. In melting it, use a flux composed of 3 parts of lime and 1 part of fluor-spar, well mixed. Two or three pounds of this mixture are employed for 100 lbs. of nickel. Part is put into the crucible with the nickel, and the remainder after the melting has begun. Are your gas engine tubes nickel? They are often made of nickel-steel.

QUESTION No. 670. We are about to begin the manufacture of brass candlesticks and would like to obtain a brass mixture for casting them so that they will have a green shade found in some kinds of brass and so much admired.

Answer. You will have to use "low-brass" for this class of work as the other mixtures do not have the desired green shade. The regular mixture for "low-brass" is 4 parts of copper and 1 part of spelter, but it is too soft without the addition of some tin, and does not cut freely unless lead is added The following mixture is excellent:

Copper	70 lbs.
Spelter	25 lbs.
Lead	3 lbs.
Tin	2 lbs.

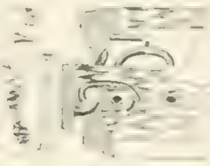
If the brass is too hard add less tin, but the mixture will be found about right for the majority of purposes.

QUESTION No. 671. We send you a brass casting that we are bidding on, and wish to know what the finish is on it. It has the appearance of aluminum paint and we must supply them in the same condition.

Answer. The casting has been electro-tinned in a good tin plating solution. The tinning of brass castings by the electric current is now extensively done as it serves to protect the brass from corrosion in such places as soda fountains, ice [illegible] and other articles in which food is used. When new and fresh the tin deposit is very white, but after it has been in service or exposed to the atmosphere for some time it becomes more or less dull so that it resembles, as you state, an aluminum surface.

Patent Abstracts.

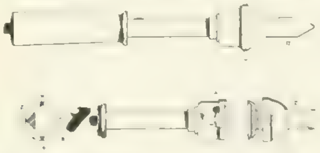
923,591, June 1, 1909. APPARATUS FOR MOLDING SOLID CHAIN LINKS. Wm. C. Herron, of Sarnia, Ont. The mold herewith shown is so constructed that the chain may be cast continuously. The mold is self-explanatory.



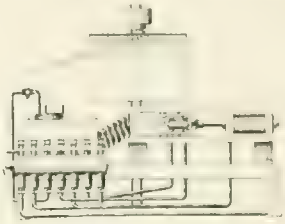
925,708, June 22, 1909. APPARATUS FOR PRODUCING HOMOGENEOUS DUCTILE BODIES FROM METALS OF A HIGHLY REFRACTORY NATURE. Werner Von Bolton, of Charlottenburg, Germany, assignor to the Siemens & Halske Co., of Berlin, Germany. A method of making fused masses of metals like tantalum, niobium, tungsten, zirconium, etc. The powdered metal is melted in a vacuum by means of special apparatus. It is stated that a metal free from absorbed gases or oxide is thus produced and which is ductile.

12,964 (reissue), June 1, 1909. PROCESS OF MAKING GRAPHITE. Edward C. Acheson, of Niagara Falls, N. Y., assignor to the International Acheson Graphite Co., of the same place. This is a re-issue of the original patent for making artificial graphite. Powdered coke and oxide of iron are heated in a electric furnace. Graphite is produced and can be separated from the reduced iron and other products.

925,056, June 15, 1909. ELECTRIC SOLDERING IRON. Tycho Van Aller, of Schenectady, N. Y., assignor to the General Electric Co., of the same place. An electric soldering iron, so constructed that the tip as well as the heating unit may easily be removed.

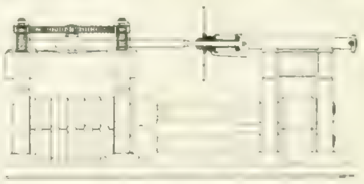


924,858, June 15, 1909. CASTING APPARATUS. Elbert B. Van Wagner, of Syracuse, N. Y. This invention relates to improvements in apparatus for making the now well known "finished" or "die" castings, in which the metal is forced into the mold by pressure. The feature of the patent is in the use of a number of new devices not heretofore employed, such as a shield for enclosing the dies to prevent injury to the operator, means for admitting fluid pressure to the melting pot for forcing the metal, and a common air retainer. Other appliances are also used as may be seen by perusal of the complete specification.

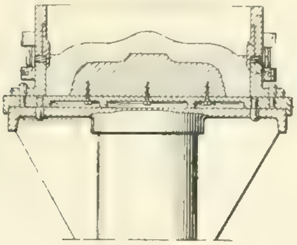


924,728, June 15, 1909. MANUFACTURE OF MOLDS FOR CASTING METALS. Ernst L. Bohl, of Brooklyn, N. Y., assignor of one-half to Robert F. Barrows, of Rutherford, N. J. A mixture of equal parts of plaster of Paris and ashes is used for the mold. It is poured over the pattern, allowed to harden and then baked. It is then soaked in lard to maintain in dry condition and prevent the absorption of moisture.

923,726, June 1, 1909. APPARATUS FOR ROLLING TUBING. Ralph C. Stiefel, of Ellwood City, and John H. Nicholson, of Pittsburg, Pa., assignors to the National Tube Co., of Pittsburgh, Pa. The apparatus is used for rolling seamless tubing over a mandrel. It is intended to obviate the loss of time and delay in removing the tubes from the rods, upon which they are delivered as they pass from the rolls, and are returned to the feeding side of the rolls.

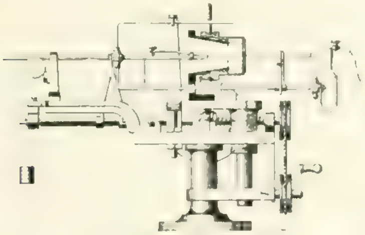


925,240, June 15, 1909. METHOD OF AND APPARATUS FOR FORMING MOLDS. Frederick W. Taylor and Wilfred Lewis, of Philadelphia, Pa., assignors to the Tabor Mfg. Co., of Philadelphia, Pa. The invention is upon a molding machine for forming green sand molds by "jarring." The sand, pattern and flask are rapidly "jarred" by mechanism underneath which serves to pack the sand tightly around the pattern. The pattern is then removed by power leaving a completed half of the mold.



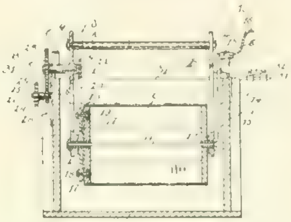
924,413, June 8, 1909. MANUFACTURE OF BIMETALS. Anselme Astruc, of Courbevoie, France. The process is applied to the manufacture of compound metals, such as copper and steel. The sheets of the metals are cleaned, then placed together and heated in a muffle containing a reducing or non-oxidizing gas, up to the point of softening of the copper. The sheets are then rolled together which, the inventor claims, welds them together.

925,233, June 15, 1909. MACHINE FOR POLISHING DIAMOND DRAW PLATES. Edward Schmidmer, of Nuremberg, Germany. The machine is intended for piercing diamonds for making draw plates to be used in wire drawing. The diamond is oscillated while the grinding is taking place so that it is ground evenly at all points.

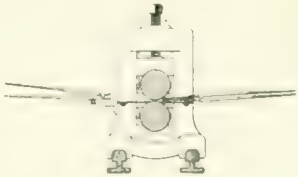


925,321, June 15, 1909. PROCESS OF FACING STEREOTYPE METAL. Wm. R. Fisher, of San Francisco, Cal. The feature of the patent lies in the copper plating of stereotype plates used for printing in order to render them more durable. The face of the plate is cleaned and then immersed in a solution of chloride platinum which turns it black from the deposition of platinum. After this copper is deposited in the regular manner.

925,599, June 22, 1909. ELECTROPLATING APPARATUS. John B. Russ, of Shelton, Conn., and Chas. H. Poland, of Bridgeport, Conn., assignors to the R. N. Bassett Co., of Shelton, Conn. The feature of this invention is in the provision for the return current. Leading from the cathode, it is carried by an independent part insulated from the solution. The disadvantage of short circuiting is thus avoided and also the tendency of the solution to deposit metal upon the parts immersed that are made of metallic material.



12,975, June 15, 1909 (re-issue). METHOD OF ROLLING SHEETS. Alexander Patterson, of Buffalo, N. Y. A method of rolling sheet metal in packs so as to overcome the necessity of re-heating of the pack. Three bars are immediately rolled on a two-high mill, and each sheet given a succession of passes. They are then piled with their initial heat and the pack of three re-rolled.



923,228, June 1, 1909. METHOD OF INSULATING SHEET METAL. Willis R. Whitney, assignor to the General Electric Co., of Schenectady, N. Y. Gum copal is ground in water and a small amount of [illegible] is added. This is applied to the metal by dipping or spraying, after which it is baked. The use of the [illegible] the [illegible] of the metal.

Trade Items.

The Leather & Brass Mfg. Co., of Auburn, N. Y., manufacturers of bicycle and automobile pumps, have been taken over by a new concern called the Auburn Auto Pump Co.

The Benedict Mfg. Co. of East Syracuse, N. Y., manufacturers of art metal novelties, have recently placed a new line of brass novelties on the market and which are called "Karnak" brass goods.

After a shutdown of over a year the Ohio Brass & Iron Mfg. Co., of Columbus, Ohio, have again started their brass foundry and report an accumulation of orders for brass, bronze and aluminum castings that will keep them busy for some time.

The International Acheson Graphite Co., of Niagara Falls, N. Y., manufacturers of artificial graphite products, have commenced action in the U. S. Circuit Court against the Castner Electrolytic Alkali Co. of the same place, alleging infringement of its many patents upon the manufacture of artificial graphite.

The Buffalo Pen Co. has been organized for the manufacture of steel pens under the patents of John and Bertel Gabrielson. A factory will be equipped on Rano St. and D. L. & W. R. R. Special machinery will be used for making the pens in one operation. Heretofore, several operations have been required.

The Joseph Dixon Crucible Co., of Jersey City, N. J., are sending out to the foundry trade a hanger which they have just designed and which will be sent free to all brass foundries. It is printed in three colors and in the center is a large reproduction from a photograph showing the operation of pouring a mold from a crucible. The hanger is 18x26 inches.

The Manistee Watch Co. has been started in Manistee, Mich., and is now in operation with about 100 hands. The first watches are being turned out. The watches are of high grade and sell from $13 to $15 to the wholesale trade. It is expected that three times the present number of employees will shortly be employed. The officers of the company are Wm. Rath, president, and Joseph Bachner, secretary and treasurer.

The American Tinol Co., 2100 Fairmount Ave., Philadelphia, Pa., are now manufacturing a new form of solder called "Tinol." It is soft solder in the form of sheet or wire and made hollow. The cavity contains the flux to be used in the form of a fatty substance which, the makers state, is neither acid nor alkaline, so that it does not act upon the metal to be soldered. When the solder is used in the ordinary manner with a soldering iron or torch, the flux, being in intimate contact with it, immediately coats it so that there is no chance for it to oxidize. The soldering then takes place successfully.

The Ideal Plating Co., job platers, have opened a factory at 822 Sansom St., Philadelphia, Pa.

The Reminder Clock Co. has been organized at Easton, Pa., to manufacture "Mission" clocks. The capital stock is $50,000.

The Wm. B. Kerr Co. of Newark, N. J., manufacturers of sterling silver wares, will erect a new two story factory at 184 Emmett St., and which will be 50 x 100 feet.

An observatory for establishing their own time will be built by the Elgin National Watch Co. of Elgin, Ill. They declare that the standard time of the Government is not accurate.

The American Instrument Co. of Newark, N. J., manufacturers of ammeters, voltmeters and other electrical measuring instruments, went into bankruptcy on April 5th. W. T. Carter is the trustee.

The Syracuse Aluminum & Bronze Co., of 530 Leavenworth Avenue, Syracuse, N. Y., manufacturers of aluminum and bronze castings, are to construct a new foundry to contain 60,000 square feet of floor space. It will contain all the modern appliances for making castings with particular attention paid to aluminum castings of which the company has made a specialty.

The Farrel Foundry & Machine Co., of Ansonia, Conn., manufacturers of all kinds of rolling mill machinery, hydraulic presses, and brass working machinery, have opened a branch office at 1011 Williamson Bldg., Cleveland, Ohio. This office is under the management of George W. Osborn and the business of the Western district will be looked after from it.

S. T. Antcliff, founder of the Brass Foundry & Heating Co. of Peoria, Ill., has sold his interest in the business to Jacob J. Kasjens, who has been his associate in the company for twenty years, and E. B. Hazen, who has been connected with them for fourteen years. Mr. Antcliff will retire from the business and it will be continued as in the past, but with Mr. Kasjens as president and Mr. Hazen as secretary and treasurer. The location of the company is on South Adams St.

The firm of T. B. Hagstoz, Ltd., 709 Sansom St., Philadelphia, Pa., have been succeeded by T. B. Hagstoz & Son, who will continue the business as heretofore. The change is one in name as the policy of the company will be the same as in the past. The products of the company, however, have been increased by the addititon of dental gold, in cylinders, ropes and foil, and also by the manufacture of gold and silver solder and alloys. These alloys will be supplied to the trade. The refining of gold and silver, as well as the smelting of sweeps, will be carried on as in the past.

The Metric Metal Co. of Erie, Pa., manufacturers of water and gas meters, and also brass founders, are enlarging their plant.

T. F. McGann & Sons, brass founders, at 104 Portland St., Boston, Mass., are to build a new brass foundry in Somerville, Mass.

A new brass foundry for the manufacture of brass, bronze and aluminum castings, is being built by the Marsden Brass Foundry Company, of Milwaukee, Wis.

The Monroe Brass Co. has been incorporated at East Stroudsburg, Pa., with a capital stock of $50,000 to conduct a brass foundry. I. B. Gilbert is the organizer.

The Indiana Rubber & Insulated Wire Co., of Jonesboro, Ind., manufacturers of insulated copper wire and rubber goods, are to erect a three-story addition for the manufacture of automobile tires.

The American Vanadium Co., of Pittsburg, Pa., had an exhibit of their products at the Convention of the Railway Master Mechanics and Car Builders at Atlantic City, June 16-23, and samples of vanadium steel, cast-iron with vanadium, bronzes and brasses were shown.

Extensive additions are now being made to the plant of the P. A. Coon Silver Mfg. Co., of Syracuse, N. Y., manufacturers of silver plated ware. Improvements are also being made in the equipment of the factory so that a capacity of over 2,000 pieces per day will be had. The plant is located at 135 North Warren Street.

A large detinning plant is being erected by the Goldschmidt Chemical Company, at Syracuse, N. Y., and the equipment is being purchased for it. Dr. F. H. Hirschland is the general manager of the company, and much special machinery will be installed. The removal of tin from tin plate scrap will be carried on.

The Baldwin Locomotive Works, of Philadelphia, Pa., which has been conducted in the past as a firm, has now been incorporated with a capital stock of $20,000,000. The business was founded in 1831 by Matthias Baldwin and has become one of the largest concerns in the United States, employing some 20,000 hands and turning out nearly 3,000 locomotives per year.

The Orford Copper Co., 43 Exchange Place, New York City, has been awarded the contract for supplying a full set of propeller wheels of Monel Metal for the battleship Florida now building at the Brooklyn Navy Yard. The wheels will be 9 feet 2 inches in diameter and weigh about 5,500 lbs. Orders for twenty other propellers of Monel Metal have been awarded this company.

The Burns Plating Works has been started by James F. Burns at 57 Golden Hill Street, Bridgeport, Conn., to carry on jobbing, electroplating, polishing, buffing, oxidizing and lacquering. A specialty will be made of automobile work. The proprietor was formerly a member of the H. O. Taylor Mfg. Co. and foreman of the polishing and buffing department of the Acetylene Lamp Co., of this city.

The Illinois Pump & Brass Co. have been organized at Peoria, Ill., with a capital stock of $15,000.

The Crescent Metal Coloring Co. of Providence, R. I., jewelry colors and electroplaters, have moved to 129 Eddy St. in that city.

The Central City Iron Works, of Stevens Point, Wis., manufacturers of iron and brass castings, and which has been idle for some time, has again been started and the same line of work will be carried on.

The California Lock & Hardware Co., of Los Angeles, Cal., have absorbed the Pacific Malleable Casting Co. and the Western Lock & Hardware Co., of Los Angeles. Their foundry is at Riverside, Cal., and they are now purchasing new equipment.

The American Metal Co., Ltd., 43 Exchange Place, New York City, have increased their capital stock from $3,000,000 to $3,500,000 and the number of directors of the company from six to seven. They have also amended the articles of incorporation so that a portion of the earnings each year may be distributed among the officers and employees for services rendered.

The new buildings of the Indiana Brass & Bronze Co., at Marion, Ind., which are now under construction, will practically double their floor space. A finishing department will also be installed for the finishing of the brass, bronze and aluminum castings, which are manufactured. This is a new departure as the unfinished product has only been made in the past.

The Newfield Plating Co., 15 Sixth Street, Bridgeport, Conn., recently started by Geo. C. Guggenheim and Fred R. Griffith, is now in active operation and jobbing electroplating of all kinds, as well as polishing, lacquering and coloring, is carried on. The proprietors were with the Holmes & Edwards Silver Co. for many years and have had extensive experience in silver and gold work.

Thomas W. Shepard and Robert A. Gaines have purchased the plating plant of John Alexander at 105 Trumbull Street, Hartford, Conn., and will carry on jobbing, electroplating, polishing, oxidizing and lacquering of all kinds for the trade. Both the proprietors are experienced in builders' hardware finishing and of which customers will receive the benefit. The plant will be modernized in every respect and only first-class work done.

Preliminary sketches of the new factory of the Whiting Mfg. Co., to be built at Bridgeport, Conn., have been prepared by F. A. Ware, the engineer of the company. Twelve different [illegible] have been asked to submit [illegible] five steel and brick buildings [illegible] constructed, with a floor [illegible] feet. A boiler house [illegible] will be installed. The Whiting [illegible] one of the largest manufacturers of sterling-silver ware in the United States [illegible] located in New York City.

The Bayonne Brass Foundry has been organized at Bayonne, N. J., to make brass and aluminum castings. C. F. Knapp and J. H. Van Ness are the organizers.

The Los Angeles Badge & Medal Co. of Los Angeles, Cal., are to equip their factory with a plant for making souvenir medals in all metals.

The Lapides-Shanbrom Co., 102 Commerce St., New Haven, Conn., have gone into bankruptcy. They were scrap metal refiners and dealers, and also makers of yellow and red brass ingot metals.

Rogers, Lunt & Bowlen of Greenfield, Mass., have purchased the building which they have occupied for some time and will use it for the manufacture of their sterling-silver flat-ware. The rapid increase of their business has made this necessary.

The National Tube Co. of Pittsburg, Pa., are now manufacturing seamless wrought steel bells and gongs for locomotive and other uses. They are made up to thirty inches in diametter and are used in place of the more expensive bell-metal articles.

The J. E. Mergott Co., Jelliff Ave., Newark, N. J., manufacturers of sheet metal novelties such as match-boxes, ornaments, and similar kinds of wares, are to build a two story brick and concrete factory to cost $15,000. It will be 40 x 90 feet.

The Vocalion Organ Co., of Worcester, Mass., is being moved to Meriden, Conn., where it will be consolidated with the Aeolian Co., of that city. An electroplating plant was recently installed at the plant in Meriden on Tremont Street, to take care of their goods which need electroplating.

The Shepard Mfg. Co. of Melrose Highlands, Mass., are manufacturing a new line of mourning jewelry made of silver and of quite unique design. A black enamel is fused upon the sterling silver base in special designs so that the white color of the silver appears as the background.

The report of the president of the Vulcan Detinning Co. of Sewaren, N. J., recently submitted, shows a net profit of $182,619, an increase of $111,467 over that of the previous year. The report states that the increase in profits was occasioned by the improvements made and the greater amount of business done. The profits from the sash-weight plant, in which the iron left after detinning is made into sash weights, also contributed to the profits.

The Leeds & Catlin Co. of Middletown, Conn., manufacturers of phonograph records, have gone into bankruptcy with estimated liabilities of over $1,000,000. The recent decision in favor of the patents of the Victor Talking Machine Co. of Camden, N. J., was the cause of the failure and which, it is said, rendered the stock of records of the company practically useless. The Leeds & Catlin Co. have carried on electroplating in the manufacture of the phonograph records.

The Grand Rapids Stove Co. of Grand Rapids, Mich., are building a new plant at Battle Creek, Mich., to manufacture ranges and gas stoves.

The Great Western Smelting & Refining Co., smelters and refiners of metals, have moved to 41st and Wallace St., Chicago, Ill.

The Duncan Electric & Mfg. Co. of Lafayette, Ind., manufacturers of electric instruments, are to build a new factory 130 x 132 feet and five stories high.

The National Cycle Mfg. Co. of Bay City, Mich., manufacturers of bicycles and automobile parts, are building a three story addition to their works, 60 x 150 feet, which will be equipped with new machinery.

The Marks Lissburger Company, Ltd., 281 Borden Avenue, Long Island City, N. Y., are sending out to the trade the "Office Boy's Philosophy," which gives, among other things, a list of the tin and lead products which are made by them.

It is reported that the business of the Briggs Co., of Portland, Conn., manufacturers of wire goods, and which is now in the hands of a receiver, will shortly be taken over by the Portland Specialty Co., which has been incorporated for this purpose. A line of wire and metal novelties will be manufactured.

The Garwood Bronze & Iron Works, of Garwood, N. J., recently incorporated to make iron and brass castings, have taken the plant and business of the Enterprise Foundry Co. In addition to the manufacture of iron, brass, bronze and aluminum castings, japanning will be carried on.

Patterson, Gottfried & Hunter, Ltd., 211-215 Centre Street, New York City, the well-known dealers in hardware and tools, are sending out to the trade their catalogue, No. 225, describing their line of tinsmiths', steam fitters' and plumbers' tools. It will be sent to the trade whenever desired and will prove a useful accessory to the purchasing department of the manufacturer.

D. M. Watkins & Co., 95 Pine St., Providence, R. I., manufacturers of jewelers' findings, have recently installed an equipment for making figured sheet metal. This sheet metal is made in strips up to 6 inches in width and of various fancy designs. It is very useful in making up various kinds of ornamental goods as it obviates the need of manufacturers making dies and will, therefore, result in a large saving of time and money for them.

The Veeder Mfg. Co. of Hartford, Conn., manufacturers of "Veeder Castings," are sending out a booklet to the trade describing their product. The booklet gives a description of the metal used for the castings and numerous illustrations are shown giving an idea of the application of their product. The booklet will be sent to those who desire it. The castings are made in finished metal molds so that no machine work is necessary upon them.

The Twin Heat Stove Co. has been incorporated at Lebanon, Ind., with a capital stock of $50,000 to manufacture stoves.

The Hays Mfg. Co., of Erie, Pa., manufacturers of plumbers' brass goods and steam metal valves, are building an addition to their machine shop.

The Rapid Motor Vehicle Co. of Pontiac, Mich., are to build a new factory 60 x 640 feet. It will be two stories high and of brick.

The Noiseless Typewriter Co. have acquired the factory of the old Keating Bicycle Co. at Middletown, Conn., and more recently occupied by the Eisenhuth Co., manufacturers of automobiles, and will occupy it for the manufacture of a noiseless typewriter.

The Osborn Mfg. Co. of Cleveland, Ohio, manufacturers of foundry supplies and brushes, have brought out a new form of foundry riddle called the "Sivquick." This riddle differs from others on the market in that it is so constructed that the sifting area is greatly increased and with the accompanying rapidity of operation.

A new departure in the manufacture of watch dials has been made by the Waltham Watch Co. of Waltham, Mass. The dials are finished in a dull, white silver finish and the letters are unusually heavy. The object is to render the dial unusually legible. These dials are used more particularly upon watches intended for railroad use.

The Phenix Tube Co., 182 North 11th. St., Brooklyn, N. Y., are the largest manufacturers of iron and steel lined brass and bronze tubing in the United States and are now supplying nearly all of the bedstead manufacturers with these products. This tubing, however, is now entering many other lines of trade as it is cheaper than solid brass or bronze tubing. They also make brazed square and round steel tubing without the brass covering and which can be used in many lines of trade with good results on account of the fact that it is cheaper than seamless steel tubing.

The Miller Mfg. Co. of Providence, R. I., are now manufacturing a very complete line of compounds for the cleaning, tumbling, burnishing, and drawing of metals of all kinds. Among other materials manufactured are "Kleanola," a new compound that will remove Vienna-lime from polished work; "Fig Cleanser," the new material used in place of whale-oil soap, but which has no smell at all; "Burnishing Compound" for use in tumbling steel work with steel balls; "Brown Chips" for cutting down work in the tumbling barrel; "White-Tallow Chips" for blanking and drawing metals, and "Green Olive B" for heavy wire drawing and "White Powder" for fine wire drawing. Samples of these compounds will be sent upon request and metal workers and electroplaters should not fail to investigate the merits of them.

The Kathodion Castings Co. have been organized at Kingston, N. Y., with a capital stock of $15,000 to manufacture metal goods.

The Frazier Stove Co. of Anderson, Ind., stove manufacturers, have increased their capital stock from $50,000 to $100,000.

The Waterbury Battery Co., of Waterbury, Conn., manufacturers of electric batteries, are to erect a new factory building.

The Seymour Mfg. Co. of Seymour, Conn manufacturers of rolled German-silver, brass, bronze and copper, and nickel anodes, are installing a new steam power plant.

The American Valve & Meter Co. of Cincinnati, Ohio, have been reorganized and the vice-president, V. T. Price, has been elected acting president. N. Paul Fenner, Jr., formerly president and general manager, has retired on account of ill health.

The Kinsey Mfg. Co., of Dayton, Ohio, manufacturers of automobile parts, will move to Toledo, Ohio, where a new factory will be occupied. It adjoins that of the Pope Motor Car Co., recently purchased by the Overland Automobile Co., of Indianapolis, Ind.

The American Safe & Lock Co. of Cincinnati, Ohio, manufacturers of safes and locks, are located at 206-212 Lawrence St. in that city. This company was recently organized and will make a full line of fireproof safes and vaults. Orders have been placed for practically all the equipment required for manufacturing.

Personal.

Charles K. Thomas, formerly sales manager of the D. T. Williams Valve Co. of Cincinnati, Ohio, has been elected vice-president of the company to succeed the late Francis X. Pund.

Chas. S. Witherell, formerly superintendent of the copper department of the American Smelting & Refining Co., at Perth Amboy, N. J., has been made superintendent of the copper department of the Balbach Smelting & Refining Co., at Newark, N. J.

Obituary.

Joseph Porter, president of the Peck Bros. & Co., of New Haven, Conn., manufacturers of plumbers' brass goods, died on June 8th in New Haven, aged 70 years.

Joseph C. Cabble, president of the William Cabble Excelsior Wire Mfg. Co., of Brooklyn, N. Y., manufacturers of brass and bronze wire, died on June 14 at his home in that city.

Milton Jackson, president of the Miller Lock Co., of Philadelphia, Pa., died on June 5th in Shanghai, China, at the age of 64. He was a graduate of the University of Michigan and became connected with the concern in 1871.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Acetone, pure, 98-99%	℔.	.22
Acid, Acetic, pure, 30%	℔.	.07
Acid, Arsenious (White Arsenic)	℔.	.20
Acid, Benzoic	℔.	.55
Acid, Boracic (Boric), pure	℔.	.12
Acid, Hydrochloric, see Acid, Muriatic.		
Acid, Hydrofluoric, 30%	℔.	.04
Acid, Hydrofluoric, 50%	℔.	.10
Acid, Muriatic, 20°	℔.	.02
Acid, Muriatic, c.p., 20°	℔.	.07
Acid, Nitric, 38°	℔.	.05⅝
Acid, Nitric, 40°	℔.	.05⅞
Acid, Nitric, 42°	℔.	.06¼
Acid, Nitric, c.p.	℔.	.08
Acid, Sulphuric, 66°	℔.	.01¾
Acid, Sulphuric, c.p.	℔.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	℔.	.04
Aluminum, Sulphate	℔.	.06
Aluminum, Metallic, in ingots	℔.	.24
Aqua-Fortis, see Acid, Nitric.		
Ammonia Water (Aqua-Ammonia), 20°	℔.	.04¾
Ammonia Water (Aqua-Ammonia), 26°	℔.	.06¼
Ammonia Water, c.p.	℔.	.08
Ammonium Carbonate, lump	℔.	.15
Ammonium Chloride (Sal-Ammoniac)	℔.	.12
Ammonium Hydrosulphuret	℔.	.30
Ammonium Sulphate	℔.	.07
Ammonium Suphocyanate	℔.	.50
Amyl Acetate	gal.	1.85
Antimony	℔.	.08
Antimony Chloride (Butter of Antimony)	℔.	.23
Arsenic, Metallic	℔.	.15
Arsenic, White (Acid Arsenious)	℔.	.20
Argols, White (Cream of Tartar)	℔.	.31
Asphaltum, Commercial	℔.	.05
Asphaltum, Egyptian (Bitumen)	℔.	.30
Benzine	gal.	.20
Benzol, Pure	gal.	.75
Bismuth, Metallic	℔.	1.75
Bitumen, see Asphaltum.		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	℔.	.10
Borax Glass	℔.	.35
Cadmium, Metallic	℔.	.75
Carbon Bisulphide	℔.	.10
Calcium Carbonate (Precipitated Chalk)	℔.	.10
Chrome Green	℔.	.50
Copper, Lake (cask)	℔.	.13¾
Copper, Lake (carload)	℔.	.13½
Copper, Electrolytic (carload)	℔.	.13
Copper, Electrolytic (cask)	℔.	.13¼
Copper (Casting (carload)	℔.	.13
Copper, Casting (cask)	℔.	.13¼
Copper Acetate (Verdigris)	℔.	.35
Copper Carbonate, dry	℔.	.25
Copper Sulphate (Blue Stone)	℔.	.09
Copperas, see Iron Sulphate.		
Corrosive Sublimate, see Mercury Bichloride.		
Cream-Tartar, see Potassium Bitartarate.		
Cryolite	℔.	.12
Cyanide, see Potassium Cyanide.		
Dextrin	℔.	.15
Emery Flour	℔.	.04
Emery, F F & F F F	℔.	.03
Flint, powdered	℔.	.01
Fluor Spar	℔.	.01¼
Fusel Oil	gal.	1.75
Gelatine, Nelson's	℔.	1.15
Gold Chloride	dwt.	.60
Gum Copal	℔.	.30
Gum Damar	℔.	.30
Gum Elemi	℔.	.70
Gum Guiacum	℔.	.26
Gum Mastic	℔.	.70
Gum Sandarac	℔.	.35
Gum Shellac, brown	℔.	.50
Gum Shellac, white	℔.	.60
Iron Perchloride	℔.	.25
Iron Sulphate (Copperas)	℔.	.05
Lead Acetate (Sugar of Lead)	℔.	.15
Lead, Pig	℔.	.04⅜
Lead, Red	℔.	.12

Lead, Yellow Oxide (Litharge)	℔.	.12
Liver of Sulphur, see Potassium Sulphide.		
Manganese, Ferro, 80%	℔.	.10
Manganese, Metallic, pure	℔.	.75
Magnesium, Metallic	℔.	1.25
Mercury Bichloride (Corrosive Sublimate)	℔.	.93
Mercury, Metallic (Quick Silver)	℔.	.89
Mercury Nitrate	℔.	1.50
Mercury Oxide, yellow	℔.	1.80
Nickel and Ammonium Sulphate (Double Salts)	℔.	.16
Nickel Carbonate, dry	℔.	.60
Nickel Chloride	℔.	.50
Nickel, Metallic	℔.	.47
Nickel Sulphate (Single Salts)	℔.	.25
Nitre (Saltpetre), see Potassium Nitrate.		
Oil, Palm	℔.	.08
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	℔.	.15
Pearlash, see Potassium Carbonate.		
Phosphorus, yellow	℔.	.40
Phosphorus, red	℔.	1.10
Pitch	℔.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	12.50
Platinum, Metallic	oz.	23.50
Potash-by-Alcohol, in sticks	℔.	.50
Potash, Caustic (Potassium Hydrate)	℔.	.08
Potassium Bichromate	℔.	.14
Potassium Bitartarate (Cream of		
Potassium Carbonate (Pearlash)	℔.	.10
Potassium Chlorate	℔.	.15
Potassium Cyanide	℔.	.25
Potassium Iodide	℔.	2.25
Potassium Nitrate (Nitre or Saltpetre)	℔.	.10
Potassium Permanganate	℔.	.17
Potassium, Red Prussiate	℔.	.60
Potassium, Yellow Prussiate	℔.	.24
Potassium Sulphide (Liver of Sulphur)	℔.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	℔.	.70
Tartar)	℔.	.31
Pumice, Ground	℔.	.05
Quartz, Powdered	℔.	.01
Rosin, Yellow	℔.	.04
Sal-Ammoniac, see Ammonium Chloride.		
Sal-Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Fine	oz.	.53
Silver Nitrate, crystals	oz.	.50
Soda-Ash	℔.	.05
Silver, Fine	oz.	.51⅞
Sodium Biborate, see Borax.		
Sodium Bisulphite	℔.	.15
Sodium Carbonate (Sal Soda), crystals	℔.	.02
Sodium Hydrate (Caustic Soda)	℔.	.05
Sodium Hydrate (Caustic Soda) by Alcohol (in sticks)	℔.	.45
Sodium Hyposulphite ("Hypo")	℔.	.04
Sodium, Metallic	℔.	.90
Sodium Nitrate	℔.	.05
Sodium Phosphate	℔.	.09
Sodium Silicate (Water Glass)	℔.	.04
Soot, Calcined	℔.	.15
Spelter, see Zinc.		
Spermacetti	℔.	.40
Sugar of Lead, see Lead Acetate.		
Sulphur (Brimstone), in lump	℔.	.05
Tin Chloride	℔.	.45
Tin, Metallic	℔.	.29
Turpentine, Venice	℔.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water-Glass, see Sodium Silicate.		
Wax, Beeswax, yellow	℔.	.45
Wax, Carnauba	℔.	.70
Wax, Japan	℔.	.20
Whiting (Ground Chalk)	℔.	.02
Zinc Carbonate, dry	℔.	.19
Zinc Chloride	℔.	.12
Zinc Sulphate	℔.	.06
Zinc (spelter)	℔.	.05½

THE
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Why Chloride of Zinc Should be Used in Melting Aluminum.

The use of chloride of zinc as a flux in melting aluminum is one of the important improvements that have been made within the last few years in the metallurgy of this metal. Those who have not used it certainly fail to appreciate its value. Many aluminum founders now prize it as one of their most satisfactory agents for producing sound and clean aluminum castings.

When aluminum is melted, a certain amount is oxidized. This oxide does not float to the top of the metal in the form of a fine powder that may be skimmed off; but becomes entangled in the melted metal and the result is a semi-pasty mass which must be removed before the aluminum is poured into the mold. The problem would not be so difficult were it possible to skim off this pasty mass completely, but when the attempt is made it will be found that even repeated skimming will fail to remove it completely and produce a molten metal with a clean surface suitable for pouring. It is in this instance that the chloride of zinc is so valuable as it serves to remove the oxide so that a clean surface on the aluminum follows.

Chloride of zinc is made by dissolving metallic zinc in muriatic acid and evaporating to dryness. It is far better to purchase it, however, as it is quite cheap. It occurs in commerce in gray lumps which become liquid upon exposure to the air

For this reason, it must be kept in tight packages.

To use it as a flux in melting aluminum, it is thrown on the surface of the melted metal. It is *not* added before. The quantity to be used depends upon the amount of dross on the surface of the metal. The best method to follow is to throw a small piece about the size of a walnut on the surface and then stir. As soon as the chloride of zinc comes in contact with the molten aluminum, a violent reaction occurs accompanied by some smoke. When this action has ceased, the surface of the aluminum will be found quite clear, if the quantity of chloride of zinc is sufficient, and the oxide has changed to a light powder which is easily skimmed off. If the surface is still pasty, then another piece of chloride of zinc should be used. One or two pieces are usually all that are required. An excess, however, seems to do no harm.

The melted aluminum is thoroughly cleared by the chloride of zinc and it has a clean, bright appearance resembling pure tin. The castings made from it are very much improved. The effect of chloride of zinc is so good that a number of aluminum founders who have used it for a number of years, endeavored to maintain the process as a secret. In some instances it served to give them much advantage over their competitors.

Brass Plating Automobile Levers.

The enormous increase in the number of automobiles manufactured has created a demand for a good method of plating the levers used on all machines. Some makers use steel forgings for this purpose, others malleable-iron, while many make them of manganese-bronze which, of course, requires no plating.

The best method, and one followed by the leading makers of automobiles, is to "close-plate" the steel levers which they use. This was the original method of plating metals and was in use long before electroplating became known. It was extensively used in former times, but gradually became less and less employed until the advent of the automobile, when it was used to a limited extent on saddlery and carriage hardware. It is an excellent process but costly compared with electroplating. The method is simple in theory, but difficult in practice. It consists in soldering a very thin sheet of brass to the steel. The difficulty lies in making a smooth surface and without showing the joints. When a good job of brass plating is desired on an automobile lever, close-plating should be used.

Brass plating by electrodeposition, although extensively used on automobile work, is not satisfactory for the reason that it is impossible to obtain any thickness of deposit. There is no known method of accomplishing it, and while the desired color can be obtained and what would be called a "good job" on other kinds of goods, brass plated automobile hardware is unsatisfactory for this reason and soon wears off. It is unfortunate, but nevertheless so, that a heavy brass deposit, suitable for this class of work cannot be done.

A method followed in one establishment for plating automobile levers of malleable iron (the most unsatisfactory kind) is capable of giving good results. The handle, after grinding down to a surface, is given a flash deposit in a cyanide copper solution. After this, it is transferred to an acid copper solution and a heavy copper deposit put on. It is possible to deposit a very heavy coating of copper in this manner. When this is completed, the handle is cut down on a wheel and buffed, after which as heavy a brass deposit as possible is given it. When the brass deposit wears through, as it finally will, the copper is exposed underneath and this will not rust. It is possible that a zinc deposit would be preferable to the copper, on account of its greater protection to the iron, but as far as known it has not been tried.

The presence of a small quantity of iron in bells composed of copper and tin renders the grain of the casting closer and improves the tone of the bell.

According to Moissan, the presence of carbon and sodium in commercial aluminum causes it to corrode more rapidly than the pure metal. He cites a sample of aluminum made in Pittsburg which contained 0.10 per cent. of sodium and 0.11 per cent. of carbon. A sample of Neuhausen aluminum contained 0.30 per cent. of carbon.

Some Notes on Making Aluminum Castings in Green Sand Molds.

The lightness and cheapness of aluminum are the cause of its present extensive use. Many articles heretofore manufactured of brass or bronze are now made of aluminum at a less cost, and for many purposes with better results. In the case of appliances in which lightness is essential, aluminum is extensively employed. This is particularly true in the automobile trade in which more aluminum is now used in the form of castings than in any single article at present manufactured. In the early days of aluminum history, when it can be said that aluminum actually became a commercial product, brass founders were accustomed to make aluminum castings as a "side line," but to-day a number of large foundries make them exclusively and some are making an excellent profit. The aluminum casting branch of the brass foundry trade, when properly handled and good castings are made, forms one of the most lucrative fields, and if the manufacture of automobiles continues to increase as it has in the past, the demand for good aluminum castings will be enormous.

Mold for Aluminum Casting Ready for Pouring Showing Pattern in the Background.

The Aluminum Mixture.

As aluminum is used on account of its lightness, and is naturally a weak metal, the demand is for a strong aluminum alloy as light as consistent. Pure aluminum is never used for castings. It is too soft and in order to harden and stiffen it, it is customary to use copper or zinc, either singly or together as the hardening metal.

While zinc produces the strongest aluminum alloys, its use is attended with two difficulties.

1. In order to obtain the necessary stiffness and strength, it is necessary to use so much zinc that the lightness of the metal suffers. From 25 to 35 per cent. of zinc, when used alone, is required to produce the desired stiffness. It will readily be appreciated, therefore, that with such a quantity of zinc, the specific gravity of the mixture is almost too high to be of value as a light material.

2. Cracking of the castings in the mold. Owing to the fact that the aluminum and zinc mixtures are more or less brittle immediately after they have become solid in the mold, any slight strain on the casting results in rupture. This feature is unfortunate but, nevertheless, so. Castings will often have the appearance of absolute soundness until the machine work is put upon them, and then the hidden crack reveals itself. The cracking feature is the worst one in the use of the aluminum and zinc mixtures.

Copper is by far the best hardener for aluminum as far as the casting qualities are concerned, but it is open to the objection that it does not produce the strength given by zinc. It casts, however, with little difficulty and the castings are not apt to crack in the mold.

The use of both zinc and copper for alloying with the aluminum is now quite widely practiced as it is possible to obtain a much stronger metal than by the use of copper alone, and at the same time, less zinc is required than were no copper used. On this account, an alloy lighter than those consisting of aluminum and zinc alone is produced. Even with this less quantity of zinc the castings are quite apt to crack in the mold, and equally as much care is required in casting the mixture as with the one consisting of aluminum and zinc without the copper.

Making the Mixture

In making the aluminum mixture from pure aluminum, there is danger of injuring it, and the majority of brass founders, inexperienced in the manner in which the melting should be done, usually injure the metal to such an extent that it is difficult to obtain good castings. Once aluminum is injured in melting, it is impossible to restore it.

On account of the fact that every time aluminum or aluminum alloys are melted they absorb carbon, nitrogen and other gases and are injured, the use of "already made" alloys obtained direct from the aluminum smelter is to be strongly recommended when the best results are to be obtained in casting. This is the method followed by makers of aluminum castings when the highest tensile strength is desired. The aluminum alloys obtained from them have not been melted but once and contain the smallest quantity of foreign matter. This practice of purchasing the aluminum already alloyed is not advocated to aid the smelters of aluminum, but because it has been found time and time again that it is impossible to obtain as high tensile strength from aluminum alloyed by the ordinary founder as it is when the alloying metal is added in the bath by the smelter.

While many of the aluminum founders, who have been successful in making castings for automobile work, purchase pure aluminum and alloy it themselves, it is used for work which does not require the highest tensile strength, and there are always many minor parts which can thus be made; but for the castings most difficult to make and which require the highest possible strength, it is always advisable to use the aluminum already alloyed as purchased from the smelter. In this case, however, be sure that the "smelter" is not one who smelts scrap. The one who actually reduces aluminum from its ore is the only smelter who is to be considered in this direction.

Melting the Aluminum

The melting of the aluminum, either already alloyed with copper, spelter or both of these metals, or in the process of alloying it, requires much care in order to obtain sound castings. It is safe to say that more aluminum castings are injured in melting the aluminum than in any other manner.

The chief obstacle in melting the aluminum is in overheating it. It is so easy to overheat it in melting that nearly all founders err in this direction. Those who do not are scarce, and it may rightly be said that the "secret" in making aluminum castings lies in the melting.

The form of furnace does not matter. Equally as good results can be obtained in one form as another, provided intelligence is used. Some makers of high-grade aluminum castings use oil, while others who make equally as good work use coal or coke. In whatever manner the aluminum is melted, however, the matter of overheating should be carefully avoided.

In melting with oil, the heat is generated so rapidly that it is necessary to shut off the flame when the aluminum begins to melt as the radiated or conducted heat will do the rest. When coal or coke is used it is unnecessary to have any fuel around the sides of the crucible. A good bottom is all that is required.

Large crucibles have been found more advantageous than small ones in melting aluminum, and some of the new forms of furnaces that have the tilting feature are excellent for this purpose, although, of course, any kind of furnace may be used. In fact, it is possible to melt aluminum in an open iron kettle like that used in melting zinc, and this method was used at one time. Owing to the fact that the aluminum takes up iron and becomes thick and pasty when melted, the use of iron crucibles or kettles for this purpose is to be avoided. If carefully done, however, they can be employed, but it is not considered good practice.

Danger of Over-Heating.

As previously mentioned, the greatest injury that can befall aluminum is to overheat it in melting. When this is done, it oxidizes, absorbs carbon and gases and is injured so that the castings become weak and full of pin holes. The more it is overheated the greater the injury. Let it be said that even though the overheated aluminum may be cooled down by the addition of cold metal, such as gates or other form of scrap, it is not completely restored to its original condition. Each time it is melted it is deteriorated and when melted over and over it finally becomes injured so much that it cannot be used for anything but the cheapest kind of work.

To melt aluminum as it should be melted for making the best grade of castings, the proper method of procedure is to have the mold ready before the aluminum is put into the fire (in using the term aluminum it is assumed that it is alloyed as pure aluminum cannot be used on account of its softness). This method of procedure should be insisted upon by the foreman as it then insures that the aluminum will not be overheated. When the right heat has been obtained in the fire, remove the aluminum at once and pour. As aluminum takes up heat from the crucible on standing, the temperature often rises when the crucible is taken from the fire, and then it must be cooled with gates; but if taken from the fire when the temperature is slightly too low and then allowed to come up to the right heat by absorbing it from the crucible, better results are produced.

Use of Flux in Melting.

The use of chloride of zinc as a flux in melting aluminum is strongly advocated. It serves to clean the surface of the molten metal from the entangled oxide that is always present, and which renders the metal thick and unsound. As far as known, chloride of zinc is the best flux for this purpose, and it is becoming widely used. A small piece is thrown upon the surface of the molten metal and then the whole stirred. After the white smoke has disappeared, the surface will be found clean and bright. If not, then another piece should be introduced, but usually one piece is sufficient. The makers of the best aluminum castings are now using it.

The Mold.

While the mold is not as important as the melting, yet its making requires much care, and it will not be sufficient simply to make a mold of *good* appearance. It must be made *particularly* for casting aluminum. A mold that is capable of making good iron or brass castings will not answer at all for aluminum, particularly if of large size.

The sand for large work, such as that herewith illustrated in the casting of an automobile crank, should not be too fine. A good floor sand is suitable and should be mixed with some old sand in order to render it suitable for use. The pattern should be faced by fine sand so that the casting will be smooth, after which the mold is made with the regular sand. It should be worked as dry as possible, as moisture is an enemy of aluminum.

The ramming of the sand is of vital importance and as aluminum shrinks considerably in cooling and is easily ruptured, light ramming, particularly upon those portions of the mold that would hold the [illegible] ing when it shrinks, is essential. The success in making the mold usually rests upon this fact.

Gating and Risers.

The gating of the mold requires attention. In large castings, such as gear cases, which are thin and have a long distance to run, it is customary to use two or more gates. In this manner it is possible to "run" a casting that could not be made by the use of one gate. By the use of two or more gates and pouring them at the same time, it is possible to use the aluminum at a lower temperature and the casting is then less apt to crack in the mold.

Risers are usually necessary on heavy portions and should be made heavy enough to take up the shrinkage. Small risers frequently do more harm than good.

Dumping the Mold.

As soon as the mold has been poured, and the casting has "set" the sand should be dug away from the gates and risers and the cope lifted off. The sand is then loosened around it in the nowel. In this manner the strains on the casting during shrinking are reduced to a minimum.

By taking these precautions it is possible to make aluminum castings which have the highest possible strength and are free from cracks and imperfections.

Melting Nickel Alloys in Clay-Lined Crucibles.

In a patent recently issued to John T. H. Dempster, of the General Electric Co., of Schenectady, N. Y. (U. S. Patent 926,980, July 6, 1909), the method of melting nickel alloys in a clay-lined crucible is described. The nickel alloy used by the inventor is the following:

Nickel	62 per cent.
Iron .	20 per cent
Chromium	13 per cent.
Manganese ..	5 per cent.

This alloy is used by the aforesaid company for resistance wire, and in order to draw it into wire or roll into sheet, no carbon must be present in it. If an ordinary graphite crucible is used the metals take up so much carbon that they cannot be drawn into wire. The inventor says that he uses clay-lined crucibles with good results, but as commercial nickel contains a small amount of carbon, it is necessary to purify it from this substance and it is done in the crucible while the melting is going on. The method is as follows:

The clay-lined crucible used is the regular graphite type lined with a fire-clay mixture so that the metal does not come in contact with the graphite itself. In the bottom of the crucible some red oxide of iron is placed. This oxide is the mineral known as "hematite" or any pure artificial material may be employed. For 100 lbs. of the alloy melted, 8 lbs. of this oxide of iron is used.

The nickel is then charged into the crucible on top of the oxide of iron, and then a small quantity of silica and cryolite is added for a flux. When the nickel is melted, the heat is increased to promote a vigorous action between the oxide of iron and the carbon in the nickel. The action is shown by the gas bubbles which escape from the molten metal and burn with a blue flame. After the nickel has quieted down and the gas has all escaped, the carbon is eliminated and the iron and chromium are introduced. When this has been done and the mass is thoroughly melted, the manganese is added. The mixture must then be poured as soon as the manganese has melted in order to prevent the attacking of the clay lining.

By melting the alloy in this manner, it is possible, the inventor says, to eliminate the carbon from the nickel and produce a ductile alloy that will draw into wire. Such wire has a high electrical resistance, and at the same time, possesses a very high melting point. Both properties fit the alloy for use as a resistance material.

Although a few years ago all the cadmium used in the United States came from Germany, very little is now imported. An American zinc company at present produce the supply as a by-product in smelting zinc ores. Cadmium occurs in many zinc ores and is ordinarily allowed to enter the zinc. The demand for cadmium, which has now become one of the common metals, is slowly but steadily increasing, and with the lowering of the price that has taken place within the past few years, many new uses have been found for it.

Rapid Production of the Verde-Antique Finish by Means of the Current.

As the "Verde-Antique" finish is now one of the most popular, any improvement in producing it will be welcomed. It has been found possible to use the current in producing this finish on solid bronze or copper plated goods, and the results obtained in using it are good and more rapidly obtained than when it is not used. While this method leaves much to be desired, it gives quite satisfactory results compared with some of the other methods used which are quite slow and unsatisfactory.

Either solid bronze, bronze-plated or copper plated articles may be treated in this manner. If plated, the deposit of bronze or copper must be heavy. A cyanide copper deposit of one hour has given good results, although longer is safer. The solution used is apt to cut through a light deposit. The method of producing the finish is as follows:

The article to be treated is freed from grease and oil in the usual manner and then made the *anode* in the following solution:

Water	1 gallon.
Sulphate of Copper.	8 oz.
Sal-Ammoniac	8 oz.
Common-Salt	4 oz.
28° Acetic Acid..........	2 oz.
Chloride of Zinc. .	1 oz.
Glycerine	1 oz.

For a cathode a sheet of brass or copper may be used. This solution is the same recommended from time to time in The Brass World for producing the verde antique by the corrosion method. It is used cold as it has been found to give the best results under such a condition.

The article is connected as the *anode* and a strong current allowed to pass for five or ten minutes, or even less will often suffice. The strength of the current does not seem to matter as long as it is not too weak. The complete strength of the plating dynamo may be used, with the full six volts. From 25 to 50 amperes per sq. foot are suitable for the current density. In order to carry this strong current, it is needless to say that a heavy connecting wire should be used.

When the current first begins to act, the surface of the article begins to brighten and then finally becomes coated with a white scum which, though slight, is sufficient, and the article is then removed *without touching the surface or rinsing.* The The excess of solution is allowed to drain off and the article is then allowed to dry spontaneously in the air without the aid of heat. Within a few minutes the surface will begin to turn green and finally the whole will have become this color. When the surface has become dry, it will be found green all over and in the background, if the article is allowed to lie face up, it will be heavier.

Solid Bronze Article with Verde Antique Finish Produced with the Current.

The article is now quickly immersed in cold water and removed. This will turn the whole surface an even green color. It is again allowed to dry and is ready for relieving. The treatment with water may be frequently omitted as the article may be sufficiently green without it, but it serves to produce a green coating of an even nature and one that adheres. When it is not used the production of the verde is quite rapid.

Upon standing the verde becomes darker. It is well, therefore, to relieve by a stiff bristle brush, and then allow to stand in the air for several days without lacquering. The high-lights of the article will then turn black which gives it an excellent effect. While they are dark-colored when first relieved, the high-lights take on a richer color by standing.

The article is then lacquered with a flat lacquer and finally waxed. The use of the lacquer serves to hold the verde on the surface. In the background, where it is quite thick, it is apt to peel unless this is done, but when the lacquer is used, this does not take place.

The use of the current in the manner described, greatly facilitates the production of the verde. It gives a clean surface, coated with a basic copper salt which quickly turns green upon exposure to the air. A still better verde is obtained by placing the article, after it comes out of the solution, in a tight box or under a bell glass so that it dries quite slowly. This gives a very heavy verde all over the surface of the article. All verdes produced in this manner turn darker upon exposure to the light and this is an advantage, as it increases the beauty of the article.

Boron-Carbide; Surpassed Only by the Diamond in Hardness.

This interesting substance appears to have been discovered by Wöhler and Deville in 1857 who, although probably unaware of its exact composition, named it "adamantine." Boron-carbide is only surpassed by the diamond in hardness and its powder may be employed for cutting the diamond itself. It is, therefore, only slightly inferior to the diamond in hardness.

Boron-carbide consists of boron and carbon, and chemically it is analagous to silicon carbide (carborundum) composed of silicon and carbon. It is made in a number of ways, but may be produced by the direct fusing of boron and carbon in the electric furnace. In appearance it is bright and black and in the form of crystals resembling those of carborundum. It is much harder than carborundum and diamonds have actually been cut with it. The fact that the cutting is somewhat slower than when diamond dust is used, indicates that it is less hard than the diamond.

As far as known, boron carbide has not become a commercial article and has not been made outside of the laboratory. While harder than silicon carbide (carborundum) it is usually considered that it is not enough to warrant the extra cost when used commercially.

The Alloys of Silver and Palladium.

As palladium is one of the interesting metals and not extensively used, the following comments on the alloys of silver and palladium made by the late John Percy, the celebrated English metallurgists, are of much interest. These remarks were made by him about twenty-five years ago:

"Mr. W. J. Cock was, I believe, the first to investigate the alloys of these metals, and to introduce into the arts an alloy consisting of 60 per cent. of silver and 40 per cent. of palladium. This alloy is white, pretty hard, elastic, and malleable, and is not blackened by sulphuretted hydrogen. I found that an alloy containing not more than 25 per cent. of palladium was also not tarnished by this gas. I prepared a quantity of it, part of which I had manufactured into a set of weights, which now for nearly thirty years have remained as bright as at first.

"Another part of it I had rolled into sheet and converted into powder by Mr. Lane, goldbeater and bronze-powder manufacturer of Birmingham, England; and the late Mr. Herbert Minton, proprietor of the China Works at Stoke-on-Trent, obliged me by trying it upon china by firing in the usual way. The metal adhered well, and acquired a fine polish by burnishing; but its color was inferior to that of silver. Wertheim found that the specific gravity of an alloy, formerly used by dentists, consisting of 38.1 per cent. of silver and 61.9 per cent. of palladium was 10.002 (the proportions here stated, should, I believe, be reversed). When silver containing palladium is dissolved in nitric acid, some of it passes into solution."

The Center of a Test-Bar Cast in Sand.

By Erwin S. Sperry.

The following remarks are intended as a reply to the article by A. Gustersen in THE BRASS WORLD, July, 1909, page 239, in which the results of various tests made on sand castings are given. These results show considerable discrepancy in the tensile strength between the round and the square test bars, and the author of the interesting article has expressed a desire for any explanation of the difference. The differences in tensile strength between the round and square test-bars were large. In one instance that obtained from a square bar of manganese-bronze was over double that of a round bar cast at the same time and from the same pot of metal.

The difference, I believe, can be explained by the fact that in the case of the round test-bar a much larger quantity of metal was turned from the outside than was taken from the square-bar in cleaning it up by filing. As will be noted by referring to the article in question, the round test-bar as cast was 1 7/16 inches in diameter. It was turned down to 1.028 inches. In this round bar, the amount of metal removed was 0.793 square inches. The original size of the square bar as cast was 1 x 1 inch. This was filed to 0.930 of an inch on each side. The amount removed in this instance, therefore, was 0.135 square inches. In other words, the relative amounts of metal taken off in cleaning up and turning the test-bars were as follows:

Amount taken from round bar	48.2%
Amount taken from square bar . .	13.5%

It will be appreciated, therefore, that nearly four times as much metal was removed from the round bar as that taken from the square one. This fact is undoubtedly the explanation of the wide difference in the strength of the round and square bars.

If the center of a test-bar cast in sand be examined after it is broken, it will be noticed that it is usually of different structure from the outside portion. If it be manganese-bronze, the center probably will be light yellow and crystalline. The lower the tensile strength the greater the quantity of crystalline material in the center. It is this crystalline center that causes the difference in the tensile strength. Let the center of the bar containing these crystals be examined under a good magnifying lens. It will be seen that they are quite coarse and crystalline and it is natural to assume low in tensile strength.

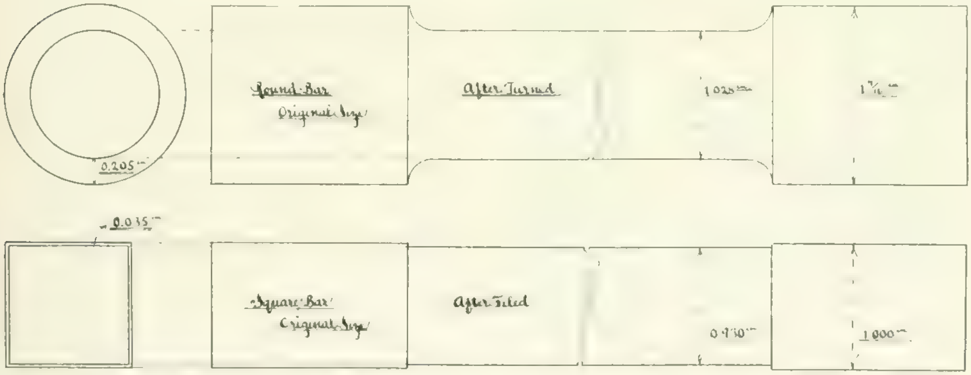
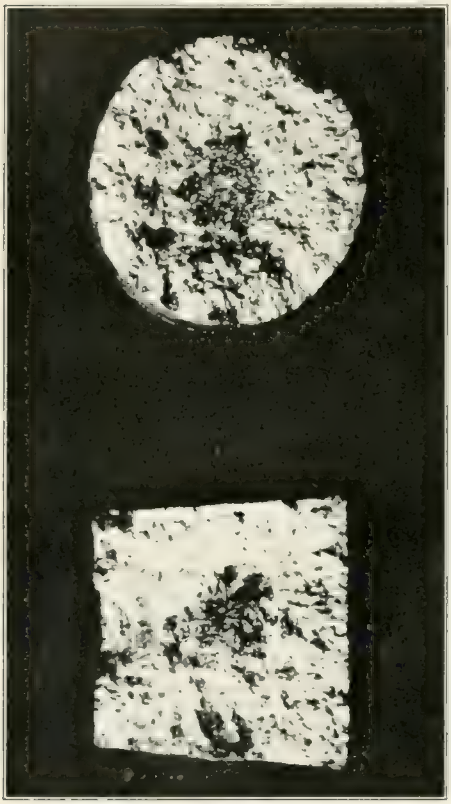


Fig. 1. Sketch Illustrating the Amount of Metal Taken from Each Test Bar.

The outside of a casting is the first to cool, and the more rapidly it cools the closer the grain of the metal. The center is the last to cool and this portion, therefore, is usually more or less crystalline. Metal which is cooled very rapidly by casting in a chill mold is usually homogeneous throughout and shows no crystalline structure.

In the case of the round test bar in which nearly 50 per cent. of metal was removed in machining, the best portion was cut off. In the case of the square bar in which only about 13 per cent. was removed, the dense metal from the outside was partially left on. It is certain if an equal amount of metal were left in both the round and the square bars, that the tensile strength would have been approximately the same.



Fractures of Manganese-Bronze Test Bars, Showing Crystallized Center.

The more that is taken off the lower the tensile strength. It is probable that if the metal of the bars were turned off nearly down to the crystalline center, the tensile strength would have been very much lower than even on the round bar.

The explanation, then, of the wide difference between the tensile strength of the round and the square bars, is that in the round bar the strongest part of the metal was cut off, while in the square bar it was left on.

Emery for Grinding Cutlery.

Some of the Sheffield cutlery firms are experimenting with a view of the more extended adoption of emery wheels for grinding instead of the sandstones hitherto used for this purpose. Nearly fifteen years ago small emery wheels were introduced for grinding razors, and to-day these are in general use in the razor trade. Several firms are now offering specially prepared emery stones large enough for grinding pen and pocket knives, and the success which has attended some of the experiments suggests that they will also supersede sandstone. The cutlery trade appears to be well disposed towards the innovation, and as soon as the efficiency of the material has been completely established no time is likely to be lost in taking it up.

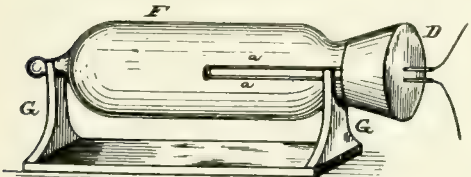
It is claimed that an emery wheel will do the work of a score of sandstones of similar size, and this superiority, if definitely established, will mean a great saving of time in hanging the stones. Moreover, after the former are once trued, no further "racing" is necessary. They can also be run much more rapidly than sandstones; they are cooler, more creamy, and produce a fine edge more quickly. Cleanliness is a strong point in favor of emery, and as working upon it produces little or no dust and dirt, manufacturers have a special inducement to adopt it in view of the new regulations for grinding shops which the Home Office is now preparing. An emery wheel costs more than one of sandstone, but its greater durability secures reduced costs in grinding. Whether emery is less liable to burst than sandstone remains to be seen. The makers state that it is quite as safe or safer, but more experience with the larger stones is necessary before a reliable opinion can be given on this point. No attempt has been made up to the present to produce emery wheels large enough for grinding table knives.—*The Ironmonger.*

It is stated by John Percy, in an article published in 1880, that silver and iridium cannot be alloyed. When the two metals are melted together at a high temperature, and then poured out, the silver alone flows from the crucible and the iridium remains behind as an unfused mass.

Edison's Process for Electroplating Non-Metallic Substances in a Vacuum.

The method of Thomas A. Edison, the well known inventor, for electroplating all kinds of substances, both metallic and non-metallic. in a vacuum is not generally known although the patent upon it was obtained in 1894 (U. S. Patent 526,147, Sept. 18, 1894) and in two years more will expire. This process, although difficult to carry out in practice, is capable of depositing a metal upon a material like wax, lace. flowers or similar non-metallic objects. Were it not so difficult to perform on a comparatively large scale, the possibilities of this method would be great. The difficulty of obtaining a vacuum when commercial operations are carried out, is the obstacle encountered.

The principle of this process (which Edison calls "Electro-Vacuous Deposition") is in the fact that when an electric current is passed through a metal enclosed in a vacuum so that it becomes melted and volatilized, vapor is given off which is deposited on the sides of the vessel containing it, and also on any object that may be present in the interior of the vessel in which the vacuum is maintained.



Manner of Making the Electrodeposition in a Vacuum.

The best method of carrying out the process is to make an arc between two pieces of the metal that is to be deposited (after the fashion of the well known arc lamp) and in this manner the metal is volatilized. The object to be coated with the metal is placed inside of the vessel used for the container in which the vacuum is produced.

When the object has been placed inside of the box and a vacuum produced by connecting the exhaust tube F with a Sprengel air pump capable of producing a complete vacuum. the current is turned on and an arc produced The metal begins to vaporize and deposits upon the object forming a metallic coating The sides of the box also receive a deposit as well as the object and this is one of the objections to the process. As heat is not transmitted in a vacuum, the object, unless it is in actual contact with the sides of the box and thus becomes heated is not injured.

Gold, silver. platinum, copper and other metals are all vaporized by this method and deposited upon an object. It is possible to make a mirror in this manner by placing a piece of glass inside of the receptacle. If a thin layer of varnish is coated over the glass it is possible to obtain a very thin sheet of any metal by allowing the deposition to take place on the surface and then peeling off.

The current used need not be of high voltage as one capable of forming a small arc is all that is required. With a 110 or even 50 volt current it is possible to obtain the results.

This method of electrodeposition would naturally seem to be the ideal one for plating or metallizing flowers, but as far as known it has not been employed for such a purpose. Probably when the patent expires in a few years, use will be made of it in this direction.

Not only can metals themselves be vaporized and deposited in this manner, but alloys as well. Varying results can, therefore. be produced. If carbon electrodes, upon which a layer of metal, such as gold or silver, has been deposited, are employed instead of the actual metal electrode, the result is the same. The metal is vaporized and deposited.

In copper plating soft metals, such as antimonial-lead novelties, the principal difficulty encountered is the formation of blisters. These are produced by the use of too strong a current or too much free cyanide in the solution. It is customary for such work to use a rather weak cyanide copper solution, low in free cyanide and heated to about 120 degrees F.

A solution of chloride of platinum and iron is the most satisfactory one for producing a French-gray color on silver-plated or sterling-silver flatware, as it is far more durable than the black produced by liver of sulphur The chloride of platinum may be used alone, but the chloride of iron serves to cheapen the mixture and also produces a darker shade

"Empire" Lacquering.

The following article on the cost of lacquering in England was recently published in the London *Ironmonger*. It is of interest as indicating the state of the lacquering art in that country.

"Before Mr. Justice Coleridge in the King's Bench Division on June 11 and 14, Escare & Denelle (Lim.), of Wardour Street, Soho, sued Mr. Lynn Jenkins, of Logan Studios, Earl's Court, to recover 241*l.* odd for lacquering, bronzing, shellacing, and also fitting up bronze-work in the United Kingdom Provident Institution building in the Strand. The defendant pleaded that the prices charged by the plaintiffs were excessive and unreasonable.

"Mr. Charles Maurice Escare said that his company specialized in 'Empire' coloring. One or two other people in England might do the same work 'more or less well.' Mr. Jenkins approached witness with reference to this work in the building in question, and said he could pay about 1*s.* 8*d.* per foot, but he (Mr. Escare) said it could not be done for that price, but would cost 5*d.* more. No price was actually fixed, but 2*s.* 1*d.* was, in his opinion, a very reasonable sum. The defendant wanted different colors eventually, and that raised the price to about 3*s.* a foot.

"Mr. Pollock, in opening for the defendant, said that the plaintiffs had been called in to do work which could be done by several firms. The price offered—1*s.* per foot run—was fair and reasonable.

"Evidence in support of the defendant's case was given by Mr. Ryder, works manager of Messrs. Elkington, who stated that his firm undertook all kinds of coloring work, including 'Empire' style. A French man, who had been with them for fifty years, did nothing else but metal coloring, but his firm had made their name before that man entered their employ.

"Mr. Arnold Jones, English representative of the Wurtemburg Manufacturing Co., said that they did a large amount of artistic coloring work. He considered 9*d.* to 1*s.* a very fair price for lacquering and coloring.

"Other witnesses were called, and in the result the jury returned a verdict for the plaintiffs for 150*l.*, and judgment was entered accordingly."

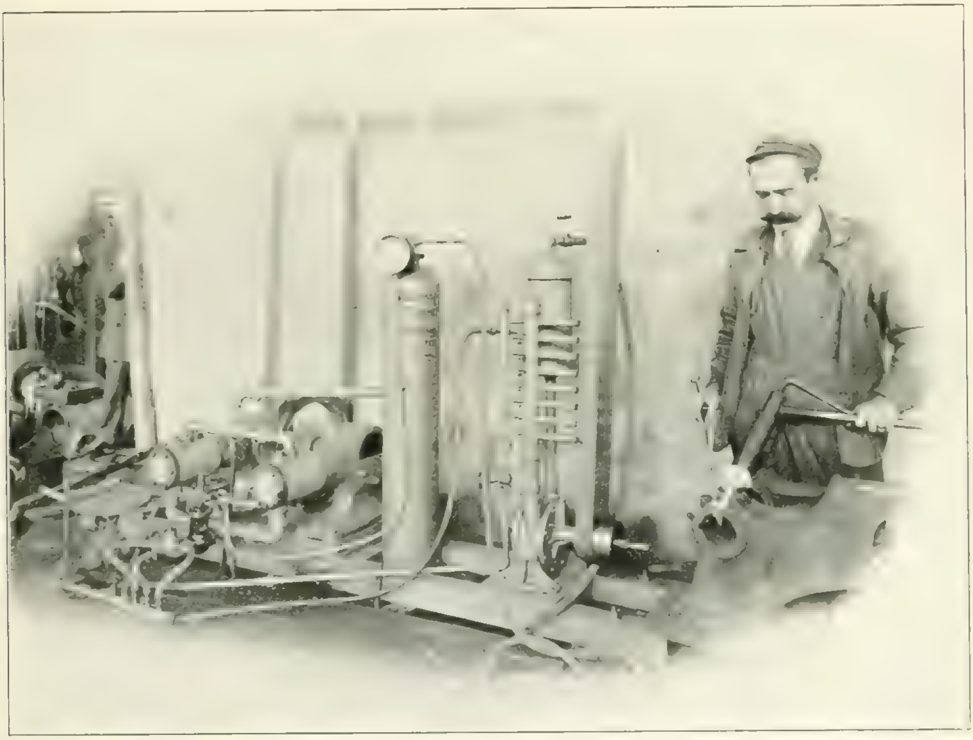
The Effect of Shock on Test Bars.

From a series of experiments made on the amount of shock that test bars are capable of resisting, Grenet (*Revue de Métallurgie*) concludes that the total effort necessary to produce rupture is considerably higher than that which will bring about the same result after being repeated indefinitely. There is no reason to suppose that any relation exists between the two figures. When a bar is subjected to shocks in excess of those it can stand indefinitely without breaking, only that fraction of the effort which strains the metal beyond the maximum elastic limit (reached after a certain number of shocks) acts as a cause of rupture. Hence it must not be inferred that a piece of metal which breaks after being in use for several years does so because the metal has undergone alteration; and in the absence of sufficient data to the contrary, it is perfectly logical to assume that the metal has experienced a very large number of shocks greater than those it is able to resist. In the case of mild steel the metal may be subjected to about two thousand shocks twice as great as those it can stand indefinitely. The coefficient of resistance to traction of elastic limit which exerts a simple influence in static tests, has an effect equal to the square of this value in the case of shocks. In view of the absorption of a portion of the effort, in shock tests, by the apparatus employed, it would seem that more accurate coefficients are obtainable with static plexion tests. Moreover, in contrast to static tests, any partial increase in the dimensions of the test piece for shock tests weakens some other portion of the piece. If, however, pieces of uniform resistance cannot be used, it is necessary that the curves of uniform resistance should compromise the portions subjected to the greatest fatigue. Finally, whilst a small portion of the test piece may have a higher resistance than the whole, the presence of a small portion with less resistance than the whole will result in that portion being subjected to practically the entire shock and lead to the rupture of the piece.—*The Ironmonger*, July 17, 1909.

The "Schaap" Process of Welding.

In THE BRASS WORLD, April, 1909, page 139, is a description of the "Schaap" process of welding and melting metals by means of a blow-pipe in which air and illuminating gas are used. This process is the invention of Alexander K. Schaap, 344 Cumberland St., Brooklyn, N. Y., and by its use not only can metals be brazed and welded, but actually melted under water as was illustrated in the aforesaid issue. The process is applicable commercially to the repairing and brazing of castings, and in the manufacture of wares of all kinds of metals it has been found excellent.

Mr. Schaap has recently installed his apparatus in a number of shops in the Middle West in which natural gas is prevalent and the results obtained have exceeded his expectations. The natural gas so far used has shown results in brazing equal to those of illuminating gas and at a much less price. In the illustration herewith shown, his installation in the plant of the American Car & Foundry Co., at Detroit, Mich., is shown. The operation of repairing an engine bed frame is reproduced.



The Installation of the "Schaap" Welding Apparatus at the Plant of the American Car & Foundry Co., Detroit, Mich.

Use of Magnesium in Casting Steel and Iron.

In a patent recently issued to Paul Rakowicz, of the Chemische Fabrik Griesheim-Electron, of Frankfort-on-the-Main, Germany, the extensive manufacturers of metallic magnesium, the use of magnesium as a deoxidizing agent for iron and steel is claimed. The inventor states in the patent specification (U. S. Patent 927,678, July 13, 1909), that the difficulty heretofore experienced in introducing magnesium into molten iron or steel has been on account of the fact that an explosion occurred when introduced, thus causing the molten metal to become projected about and rendering it dangerous for the operator. The method for overcoming it is as follows:

If the magnesium is introduced into the molten iron or steel when it is in a pasty condition, no explosion occurs. In order to carry out the process to the best advantage, the magnesium is added to the iron or steel in considerable amount until a rich alloy of iron and magnesium is formed, and this material is then used for deoxidizing the molten iron or steel. The rich alloy is made by adding enough magnesium to the semi-pasty iron or steel to form an alloy containing 1 per cent. of magnesium. This is used for introducing the desired amount of magnesium into the iron or steel that is to be deoxidized. For this purpose, the inventor says, from 1.5 to 5 lbs. of the rich alloy, containing 1 per cent of magnesium, are required for 100 lbs. of iron or steel.

A New Method for Plating Aluminum.

In a recent issue of the London *Electrical Review* a method for electroplating is described. The author, E. C. Szarvasy, states that up to this time the problem of electroplating aluminum with copper, silver, tin or other metals has not been satisfactorily solved.

The method used is to dissolve a dry salt of the metal to be deposited in methyl alcohol (wood alcohol). Unless the salt is dry, water is introduced which interferes with the success of the operation. The aluminum to be plated is cleaned by polishing or cutting down materials containing grease. When polished or scoured by such material a film of grease is left on the surface. This is not removed, however, as it serves to protect the surface from oxidation. The aluminum is immersed in the solution with the grease on it and the alcohol dissolves it, leaving a clean surface for the deposition of the metal. The deposition is carried on as usual.

In copper or nickel plating aluminum, the chloride or other soluble salt is used, but the moisture must previously be removed from it before dissolving in the alcohol.

An Automatic Machine for Buffing Spun Brass Shapes.

The machine hereinafter described is intended more particularly for buffing the spun brass bells of phonograph horns, although it may be used for other similar shapes of spun or pressed articles. The invention is that of Percy B. Taylor, of the Tea Tray Co., of Newark, N. J. (U. S. Patent 928,164, July 13, 1909). The machine is herewith illustrated in the various sketches.

Fig. 1. The Spun Brass Shell.

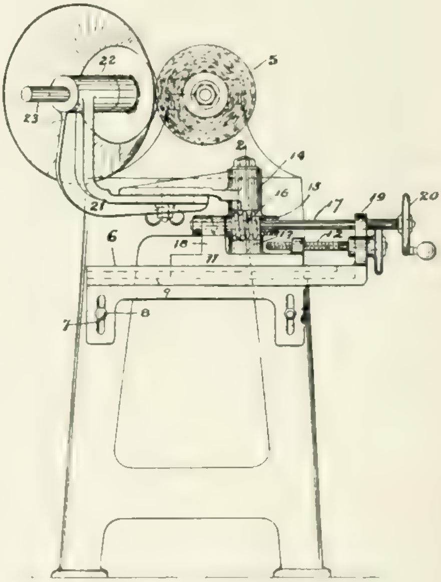


Fig. 2. Front View of the Machine.

In Fig. 1 the shape of the brass shell to be buffed is shown. In Fig. 2 an elevation of the machine is illustrated, while the plan is seen in Fig. 3.

The brass shell to be buffed is held firmly in place by means of a plate 32 to which a rod and thumb nut 34 are attached. The shell is revolved, while being buffed, by a pulley 24 driven by a belt. The buff wheel 5 is of the ordinary type and is revolved by an independent shaft and belt.

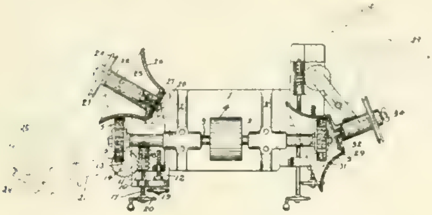


Fig. 3. Plan View of the Machine.

The buff wheel remains stationary and by means of a hand wheel 20 the shell may be moved into any desired position so that all parts can be buffed as desired. Both the inside and the outside are buffed in the same manner.

A Method of Rolling Thin "Monel-Metal" Sheets.

It is customary to roll "Monel-Metal" hot, like copper or steel, but owing to its hardness, the rolling of thin sheets has heretofore been a difficult problem. When attempts are made to roll it into thin sheet metal in "packs" the same as copper, or black steel for use in making tin plate, cracks form on the edges and the sheets break. As the rollers express it, the metal will not "draw out." "Monel-Metal," as is well known, consists of about 75 per cent. of nickel, 22 to 23 per cent. of copper, and from 1½ to 2 per cent. of iron. It is malleable while hot, but not sufficiently so to roll into thin sheets in the manner generally practiced in hot rolling other metals.

A method of overcoming the difficulty in rolling "Monel-Metal" hot has been discovered and patented by Addison H. Beale, of the American Sheet & Tin Plate Co., of Vandergrift, Pa. (U. S. Patent, 926,233, June 29, 1909). The object of the process is to allow the "Monel-Metal" to be rolled in thin sheets on hot rolls in the manner that is practiced in rolling copper or black-steel plates. The method is as follows:

The essential feature of the process lies in "sandwiching" the "Monel-Metal" between sheets of soft steel and rolling the pack thus formed. In the illustration, Fig. 1 shows the first step in making the pile to be rolled into sheet. The outside sheets 2-2 are the steel and the inner sheet 3 is the "Monel-Metal." This pile is heated and then rolled out to a length sufficient to allow doubling. The pack is next opened and re-formed. The "Monel-Metal" is laid next to one or more steel sheets and then the whole pack is doubled so that it comes on the inside. In Fig. 2 this re-formed pack is illustrated. The doubled "Monel-Metal" sheet is shown in 3a with the preferably two "plies" of steel as 2a. This pack is then rolled to the desired thickness after which it is opened and the sheets pulled apart. The steel appears to act as a cushion for the "Monel-Metal" and also assists in holding the heat. By varying the number of sheets, the thickness of the finished product may be varied.

Fig. 1.

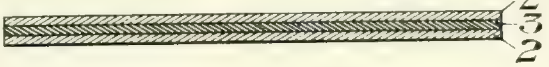
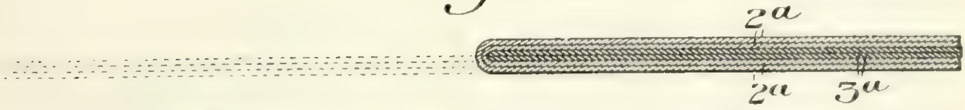


Fig. 2.



Manner of Rolling "Monel-Metal" in Packs Between Sheets of Steel.

Why Nickel Plating Solutions Occasionally Become Alkaline.

It is not infrequent to hear nickel platers remark that their solutions turn red litmus paper blue and thus are of alkaline reaction. Investigation usually proves this to be true.

Theoretically, it is impossible for a nickel plating solution made from double salts to become alkaline. If the anodes feed the solution in proportion to the amount of nickel deposited, it will remain neutral; but as this is rarely the case, the nickel is deposited more rapidly than it is taken from the anodes and the solution becomes acid in reaction.

The reason why a nickel plating solution frequently becomes alkaline in reaction is on account of contamination by the potash or lye solution used in cleaning the work for plating. This may come from imperfect rinsing, the rinse water having become contaminated by the potash or lye, or by pockets in the articles to be plated retaining the cleaning solution. In all cases, therefore, the potash or lye is carried over to the nickel solution; and while a small quantity only is carried upon each piece of work plated, the large number of pieces that are frequently plated in a day result in quite a quantity being carried into the nickel solution.

The presence of potash or lye (caustic soda) in the nickel solution may be known by its alkaline reaction (i. e., when it turns red litmus paper blue) and by the fact that the work turns black or becomes dark colored after the nickel begins to deposit, or after it has been deposited. If much potash or lye enters the solution it may also be known by the smell of ammonia, as these substances decompose the sulphate of ammonia in the double nickel salts, forming sulphate of potash or soda and liberating the ammonia gas. The remedy is to introduce a small quantity of sulphuric acid in the nickel plating solution until it becomes neutral. This point is reached when it neither turns the red litmus paper blue nor the blue litmus paper red. This point requires much care in reaching and one is apt to overdo it and add too much sulphuric acid. Notice should be taken of this suggestion as the use of too much of the acid will likewise cause difficulties equally as annoying as the presence of the alkali.

Keeping Down the Loss in Brass Melting.

A method of keeping down the loss in brass melting has been patented by Sterling Elliot, of Newton, Mass. (U. S. Patent 927,843, July 13, 1909). Instead of melting the copper and then adding the zinc, he melts the zinc and allows the copper to dissolve in it. The zinc is melted in a crucible in the usual manner and is covered with a suitable flux such as charcoal or borax. The copper in the form of shot, or other finely divided shape, is introduced and the whole allowed to remain until the brass has been formed. In connection with the process, the statement is made that, assuming that the melting point of zinc is 412° C. and its boiling point 1040° C. and also that the melting point of copper is 1000° C. and the point at which ordinary brass melts is 973° C., it will be noted that the copper begins to dissolve and form brass even at the low melting point of zinc. Even though the zinc be raised to the melting point of the brass or 973° C., which is less than the boiling point of the zinc, the brass is formed without volatilizing the zinc itself.

In carrying out this process for making brass it would seem that the essential feature of the operation would consist in an absolute control of the temperature so that the spelter does not become hotter than the melting point of the brass. If it is allowed to reach higher than this amount, the volatilization of the zinc will be excessive.

Ordinary sheet brass or that in the form of wire, as free as possible from lead, is better than brazing solder (half copper and half spelter) for brazing iron or steel as it is tougher and the joint is less apt to break. Its melting point is only slightly higher than the half and half solder, and not enough to interfere with the brazing operation in any way. Ordinary high brass wire is often sold as "spelter-wire" for brazing iron or steel.

The "Burning" of Copper During Melting and Its Effect on Castings.

There are probably more brass castings injured by "burning" the copper during melting than by any other cause. After the brass has been made by the addition of the spelter and other metals, it cannot as readily be injured while melted. The reason for this is two-fold: First, the spelter begins to volatilize when the brass becomes too hot, thus indicating that overheating has taken place. Second, the zinc forms a film consisting of oxide over the surface of the metal which protects it to a certain degree. When the copper is melted alone, however, the oxide is absorbed as rapidly as formed, thus constantly presenting new surface to the action of the air or products of combustion. It is this feature of copper melting that results in the production of bad castings.

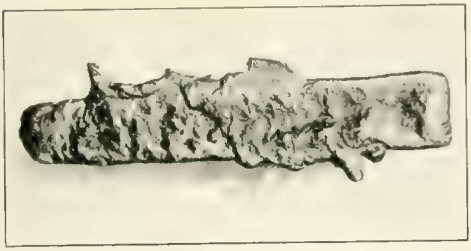


Fig. 1. Top of a Bar of Copper Containing a Large Quantity of Oxide and Showing Sluggish Nature.

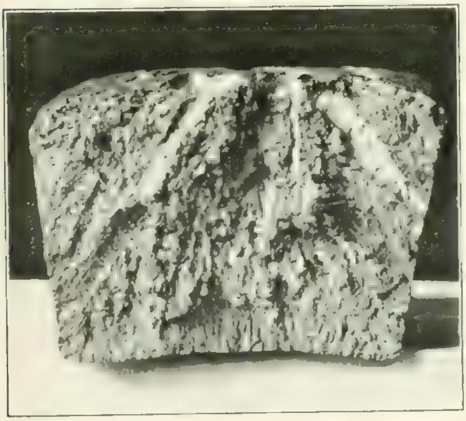


Fig. 2. Fracture of the Bar of "Burnt" Copper Shown in Fig. 1.

The common practice of melting copper alone is not the best one, although in many instances it has to be done. When scrap is to be used in the mixture (and it usually is), a small quantity should be placed in the bottom of the crucible with the copper. This scrap serves the purpose of facilitating the melting of the copper, and as there is usually zinc present in it, this metal, acting as a deoxidizing agent, answers to deoxidize the copper from the moment it is melted. In addition, the scrap acts as a sort of cushion for the copper ingots to rest upon, and thus prevents the crucible from injury. When the copper is melted, immediately add more scrap and this will also serve to deoxidize the copper. The spelter can then be added when the copper has arrived at the right heat.

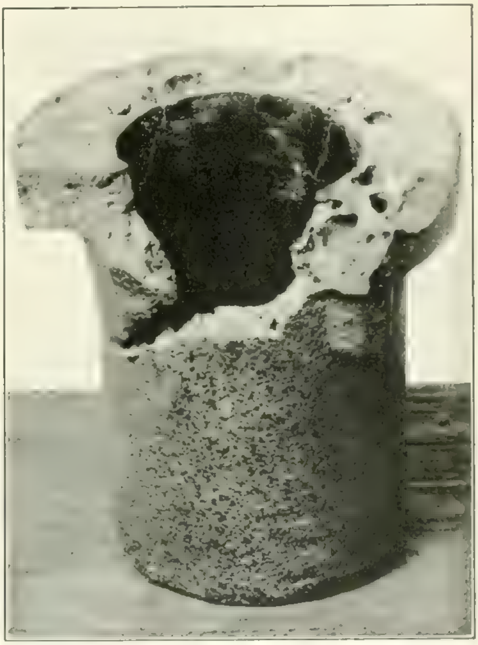


Fig. 3. Casting of Tin Bronze, Made from Copper Containing an Excess of Oxide, Showing Blowholes.

If the copper is placed in the crucible alone and allowed to melt and come to the right heat for adding the spelter, particularly if no charcoal or common salt is used in the crucible, it can safely be said that the castings will not be first class, and if the copper is allowed to overheat (or become "burnt"), the castings will be filled with blowholes, lack strength, and show a spongy structure. Alloys which contain no zinc are even more apt to show these difficulties as there is nothing in the mixture to deoxidize the copper (provided, of course, that such deoxidizing agents as phosphorus, aluminum, etc., are not used). In the illustration is shown a photograph of a casting made of copper 80 lbs., tin 10 lbs. and lead 10 lbs. The copper was melted without charcoal or salt, and somewhat overheated. The result was a casting full of blowholes, and with a rotten, spongy structure. The lead, too, had segregated in spots.

The right method of melting copper for making brass castings is as follows:

1. Place some scrap in the bottom of the crucible. Then the copper ingots may be placed upon it.

2. Put a handful of common salt in with the copper on the bottom of the crucible.

3. Add some charcoal to the crucible to cover the metal at the bottom before melting begins. Then commence the melting.

4. When the copper begins to melt add some more charcoal so as to constantly keep the melted metal covered with it. Then add another handful of salt. The object of the salt is to reduce the oxide of copper that forms.

5. When the copper has melted add the rest of the scrap, and make sure that no metal is exposed, but is well covered with the charcoal.

6. When the copper has completely melted and is at the right heat (as known by experience) the spelter is added, and then the tin and lead are introduced.

7. The metal is allowed to arrive at the right heat for pouring, when it is immediately removed from the fire and poured into the molds. The longer it is left in the fire after it has melted the more it is injured so that if the best castings are desired the pouring should take place as soon as possible after the metal is melted and has arrived at the right heat for pouring.

Scrap copper in the form of wire requires even greater care in melting than ingot metal on account of the greater surface exposed. If these precautions are taken, and they are in the best regulated brass mills, the best quality of castings will be produced and the loss will be reduced to a minimum. This practice represents that followed by the brass rolling mills in which it is absolutely imperative that the best possible metal shall be produced, otherwise it will not roll or stand the requirements demanded of it.

Steel Molds for Casting Soft Metal Goods.

The usual method of casting soft metal goods, such as coffin hardware made of antimonial lead, is by means of a bronze mold. Heretofore, bronze has been almost exclusively employed for the reason that it is readily cast, has a scrap value nearly equal to that of the new metal, and may be easily chased in finishing. Owing to the fact that a good surface is difficult to obtain on cast-iron and its varying hardness, frequently so high as to defy the chasing tool, it is rarely employed. If any finishing is to be put upon the soft metal casting made in such molds, bronze is preferable to any other metal. It does not rust, is easily chased, may be made almost to the finished shape, and when the mold becomes obsolete it may be remelted for making new ones.

Steel molds are now coming into more or less extensive use in casting soft metals such as a coffin hardware, as they have the great advantage of allowing a hard and highly polished surface to be made upon them. When the soft metal is cast in such a mold, the surface obtained is very highly polished and no finishing is required except in cutting off the gate. As practically all soft metal castings are electroplated before placed on the market, it will readily be appreciated that the production of a casting which requires no finishing is a great saving of time and money. Soft metals, which have been finished and handled are apt to become tarnished, and there is no method known for removing it except by scouring. The castings made in the polished steel molds, however, are both clean and smooth, and if not allowed to remain for any excessive length of time, can at once be plated by simply passing through a potash or lye kettle without any preliminary scouring.

The steel of which the molds are made should be as hard as possible so that it can be finished with a surface that will not dent or scratch. Steel that is too soft is of no more value than a bronze mold. The object of using steel is to obtain as hard a surface as possible. The best grade of steel for this purpose is one as high in carbon as it is possible to cut without the expenditure of an enormous amount of labor on it. The ordinary grade of tool-steel employed in making dies is that generally employed. It is *not* hardened. The steel itself is sufficiently hard for the purpose.

The tool-steel will be found very homogeneous and entirely free from pin-holes and flaws encountered in working up a bronze mold face. In this respect, the steel leaves nothing to be desired. The mold-maker takes no chances in uncovering flaws as he does in working up a bronze casting, frequently so large that the mold is found unfit for use.

The steel block used for making the mold must be cut out in the same manner as a die is made. In other words, the mold is "sunk" exactly like an ordinary steel die for stamping metals in a drop press. To be sure, this requires much work and a mold made in this manner is costly. For continuous work, like that found in the manufacture of coffin hardware, it will, however, be found a good investment as it gives castings that can be plated directly without previous preparation other than a simple cleaning from a film of grease that results from the handling. Better work then results and at a less cost than it is possible to produce from other molds. The primary cost of the steel mold, therefore, is of no importance.

Lacquered, Dead White Silver Deposits and the Cause of Their Turning Yellow.

At one time, dead-white silver was quite extensively used, but at the present time it is seldom found on art metal goods. While very pleasing and easily produced, it is quite probable that the difficulty in preserving it has been one of the reasons why it has fallen into disuse. Goods thus finished will frequently turn quite yellow after they have been lacquered and kept for a short time. A case recently came to our notice in which some articles were finished in both burnished and dead silver. The dead and polished portions were upon the same article. When lacquered and placed in the stockroom for a short time, the dead surface turned yellow while the polished surface remained in its original condition.

The cause of the formation of the yellow color on dead silver deposits is the presence of a basic silver salt in them. This is formed at the time of plating. If removed, the silver will not be subject to the difficulty.

The method of removing it is to reverse the current for a short time after the deposition has been completed. This removes the basic salt and prevents the formation of the yellow color. Another method is to hang the work, after the silver has been deposited upon it, in a warm cyanide solution, or allow it to remain in the regular silver plating solution for a short time.

The lacquer to be used on the dead silver deposit must be of the best grade and as white as possible. Contrary to the usual belief, however, the lacquer is *not* the cause of the yellow color.

"Striking" Work to be Nickel Plated.

As it is possible to deposit metals only on chemically clean metallic surfaces, it is safe to assume that in some solutions, like that in which nickel plating is done, such a surface must tarnish more or less by immersion for any length of time without allowing the current to pass.

In nickel plating it is customary to immerse the clean metal in the solution and allow it to remain there, with the current flowing, until the deposition of the nickel is completed. As nickel deposits slowly, the article to be plated, in its chemically clean condition, remains in the solution until it is completely covered with nickel, and all this time it is subjected to the corrosive action of the bath. As the tendency is to use a rather weak current in nickel plating in order to produce a soft and white deposit of nickel, it frequently may be several minutes before the article is completely covered. It has been found that under such conditions the metal is apt to tarnish or corrode sufficiently to prevent the firm adherence of the nickel deposit. This is particularly true of steel work.

Some platers now have adopted the custom of "striking" the work with a rather strong current so as to cover the surface as soon as possible, and then reduce the current in order to obtain the desired soft and white deposit. The practice is a good one for many kinds of work.

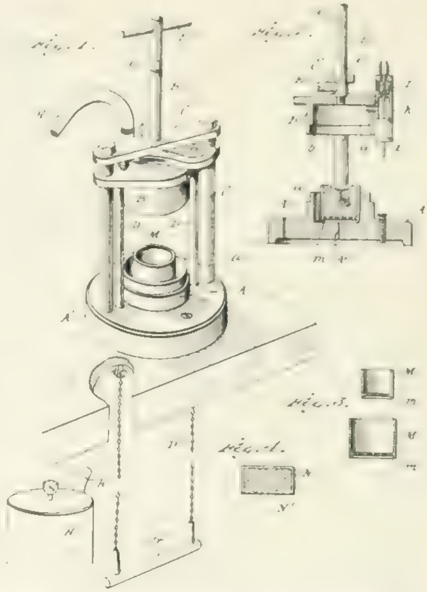
A Simple Form of Pressure Casting Apparatus.

A simple form of pressure casting apparatus has been invented and patented by Robert N. Le Cron, of St. Louis, Mo. (U. S. Patent 927,661, July 13, 1909). The apparatus is herewith illustrated. This appliance is intended for making small castings such as those needed by manufacturing jewelers, dentists and others. The pressure is produced by air or gas. The pattern used is made of wax and imbedded in the molding sand or plaster of Paris employed as the molding material.

Referring to the accompanying drawings, Figure 1 is a perspective view of an apparatus embodying the present improvements, portions being broken away, and the pressure supply tank shown diagrammatically. Fig. 2 is a vertical section taken in a plane from front to rear of the casting apparatus proper. Fig. 3 is a sectional view of flasks to illustrate the fact that flasks of various dimensions may be employed in the same apparatus. Fig. 4 is a sectional view showing an inverted cup containing a material, the use of which will be hereinafter explained.

In using the apparatus, the flask is prepared usually by surrounding the wax pattern with molding material and embedding it in such material within the flask, a suitable depression or cavity being formed in the upper surface in which the metal may be melted by means of a blow-pipe, electric arc, or usual appliances employed for this purpose. The wax pattern having been removed, preferably by inverting the flask and heating the same, the flask is placed in the lower section of the receiver and the metal placed in the depression in the top of the flask and melted. As soon as the metal is sufficiently molten the receiver is closed and the pressure simultaneously admitted, thereby forcing the molten metal into the mold, and at the same time forcing the air which may have occupied the area of the mold to a greater or less extent out through the investing material, perforated bottom of the flask, and vent A^2.

In order to make the use of the apparatus possible where no auxiliary pressure supply is available, the adjustable stop L may be moved, so that the valve will not be opened, or the pressure supply duct may be plugged in any suitable way, and to create a pressure when the receiver is closed, steam may be generated by the heat of the flask and adjacent parts from the water contained in a pad of asbestos or other material located in the upper movable section B. For instance, the inverted cup or box N, Fig. 4, may be located in the upper section B and contain either an absorbent pad of asbestos or a plastic molding material, indicated at N^1. If the material employed is a plastic mass, the cup N should be of such dimensions as to pass down around the upper edge of the flask, thereby bringing the plastic mass into contact with the upper surface of the investing material and flask. As the result of this operation, the air trapped in the cavity in the flask, or the plastic material itself coming into contact with the molten metal will force the latter down into the mold, the operation in all cases resulting in the air being forced out of the mold as the molten metal enters the same, thereby insuring a perfect reproduction of the mold cavity, without blowholes or fins of any character, save the usual sprues formed by the entrance openings for the metal.



New Form of Pressure Casting Machine.

It will be noted that the sections of the receiver are closed substantially air tight without the use of packings of any description, thereby eliminating the danger of rendering the apparatus inoperative by burning or drying out of the packings. The only escape for the air is through the special investing material, and the flasks do not have to be carefully centered or fitted into place so long as the central vent is under the perforated bottom and with apparatus of ordinary size the flasks are all of such size that even when in contact with the side of the receiver the vent will be within the annular flange. When the flasks are in place and the upper section of the receiver elevated, the top of the flasks is left entirely open and free for the use of a flux and for the application of the heating flame from a blow pipe or heater manipulated in the hand of the operator. It will also be noted that the air or gas is admitted to the receiver transversely or at the side, thus avoiding danger of chilling the molten metal.

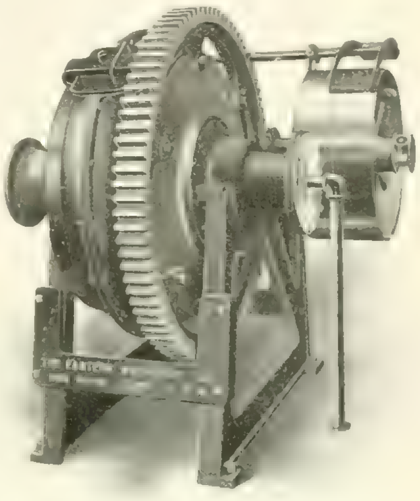
A New Form of "Hill" Cinder-Crusher.

An improvement on the well-known "Hill" cinder-crusher has been made by the Eastern Machinery Co., of New Haven, Conn., who recently purchased the patents and business from the inventor, A. M. Hill, of New Haven. The improvement is on the small barrel which has proved so successful in brass foundries which have a limited amount of cinders to wash. The improved crusher is herewith illustrated.

The crusher has been equipped with tight and loose pulleys as shown, and the driving gear has been placed at the side instead of on the periphery of the machine. There is also an improved dumping arrangement and water inlet. These devices may be understood by referring to the illustration. The crusher has been constructed on the lines of the larger machine and will do the same class of work as the larger crusher with the exception that the output of washings is less.

The method of washing brass foundry ashes is to place them in the crusher and start it revolving. A slow stream of water is allowed to flow through it. A heavy ball on the inside does the crushing by impact. As the operation goes on, the coal and cinder are crushed and washed away by the water. The clean metal is left. The completion of the operation may be known by inspection of the material in the crusher.

This small crusher is an excellent adjunct to a small brass foundry, as it consumes very little power and will enable a founder to wash his own ashes and obtain all the value in them instead of selling them to those who do not give him the market price.



The Improved "Hill" Cinder Crusher.

Fusible metals in which mercury is used are always more or less unstable. In many of them it separates on standing. Such alloys cannot be employed in commercial work with certainty.

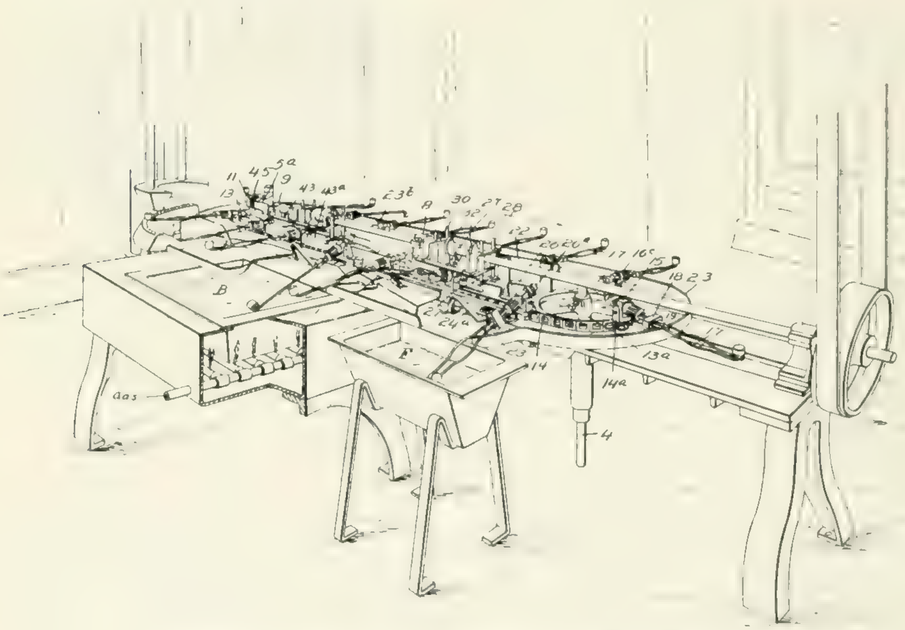
Silver and magnesium alloy in all proportions. That containing 10 per cent. of magnesium is yellowish white and finely granular, while the 20 per cent. alloy is bluish white and coarsely crystalline.

In making carbonate of copper or carbonate of zinc by precipitating the sulphates of these metals by means of carbonate of soda (sal-soda), the sulphate solution should be as hot as possible. The precipitate then becomes dense so that it settles rapidly and may be easily washed.

An Ingenious Automatic Tinning Machine.

An ingenious machine for the automatic tinning of bottle caps and similar metal goods has been invented and patented by Alfred L. Bernardin, of the Bernardin Bottle Cap Co., of Evansville, Ind. (U. S. Patent 928,172, July 13, 1909).

Bottle caps are usually made of tin plate, and after having been made, require retinning in order to remove the marks of the tools and to render them clean and bright. In making them, some of the tin is removed. Ordinarily, the tinning of such articles is expensive, if a good job is required, as each piece must be separately handled in order to produce an even and bright coating upon them. The machine herein described is intended to supplant the hand process by a machine that imitates hand work.



Bernardin's Apparatus for the Automatic Tinning of Bottle Caps.

The bottle cap to be tinned is placed by the operator on the fingers, 17 of which are arranged so that they open outwardly and grip the cap tightly. These fingers are attached to an endless chain which travels around over the flux and tinning kettles. As the cap on the fingers reaches the flux kettle F it is plunged downward and becomes covered with the flux. It is then raised and travels to the tinning kettle B where it again is depressed and becomes coated with the tin. Again raised it is automatically shaken in order to remove the surplus tin on the surface. It next passes to the cooling device 46 which serve to chill the tin and allow the cap to be removed by the operator.

Tungsten Lamp Filaments are How They are Made.

In a bulletin recently issued, the General Electric Co., of Schenectady, N. Y., describes the method used by them for the manufacture of the tungsten filaments employed in incandescent lamps. They say:

"The filament of tungsten lamps is not a wire of metal like copper or iron wire. Tungsten is too brittle to be drawn, and although the metal has been known for considerably over a century, it is only in the past few years that it has been possible to build a wire of it, a feat which has given us the tungsten lamp.

In order to make a filament of tungsten, the fine particles of the metal powder ctsgeneral form) are made into a paste with some binding material and this paste squirted through a die, which die must be made from a diamond as the only material suitable. The filament so obtained is dried, the binding material removed by suitable processes, and the particles of tungsten welded together into a continuous wire.

Metallic conductivity is generally high, and to obtain the necessary resistance with tungsten for 100 to 125 volt lamps, long and very thin filaments are required. As such filaments are somewhat delicate and soften when burning, it is necessary to provide special means for their support. The General Electric Company support their filaments in their lamps with a special and clever form of anchor, which permits burning the lamps in any position, whereas most of the tungsten lamps can be burned only in a vertical pendant position.

Although the filament of the tungsten lamp is fragile, this difficulty can be and is being overcome by special methods of packing and greater care in handling the lamps. We have the evidence of the Welsbach mantle to prove that fragility is not a very serious difficulty. The early carbon filaments were as delicate and fragile as those of tungsten are now, and nobody would have then believed that a carbon filament would be made as durable as we know it to be to-day.

The General Electric Company in the past few months have shipped over 300,000 tungsten lamps to all parts of the country, with positive and direct information from most of the packages as to breakage. The results show an average not exceeding 1½ per cent. breakage, which result compares favorably with breakage on ordinary lamps.

A point of value occurs here. It is found that tungsten filaments while burning cannot readily be broken; so if customers will keep lamps lighted while cleaning lamp, globe, or fixture, the breakage will be minimized.

The tungsten lamp is used to the best advantage with the bowl form of holophane reflector, particularly with the frosted type which gives a very soft and agreeable lighting effect.

It must be realized that the tungsten lamp in 40 watt and larger sizes is a radically new proposition in many respects. It is not a lamp to replace ordinary ones everywhere, as it has too large a candle-power and is too brilliant. It requires to be used in a somewhat more special way—above the line of vision, or in any event, suitably enclosed in frosted or opal globes, or shaded so as to avoid glare. We have in the tungsten lamp a wholly new condition, as by reason of its very high efficiency, we are no longer required to depend upon the nearby illuminant, but can flood a room or shop with a daylight brilliancy, at reasonable costs, with lamps placed well above the view. Enclosed globes and spheres can now be economically illuminated to a full and satisfactory brilliancy. All previous limitations are removed, opening up a new era of daylight illumination.

We also have in the tungsten lamp a wonderfully attractive quality of light of the brilliant resplendency of sunlight, reproducing the daylight and bringing out every color in its true tone and shade.

Finally, we have in the tungsten a lamp that practically does not change in candle-power or brilliancy, giving a good long life of 800 hours or more of (as far as the eye can tell) undimmed illumination."

Comparison of Processes of Galvanizing.

In a recent discussion of the relative values of various processes of galvanizing, the Arthur D. Little, Inc., Laboratory of Engineering Chemistry, of Boston, points out that of the four processes now generally recognized as of practical value, those of hot galvanizing and electro galvanizing are the most important, although it is probable that the dry and vapor processes will doubtless soon become commercially valuable. It is shown that each of these methods has a field of its own and that no one of the four is likely to entirely supersede the others. The latter two processes are particularly suitable for coating articles with threads, or articles which require accurate fitting, as the zinc is evenly distributed. The main advantages, however, of these two methods are purely on the manufacturing side, as, by their use, all of the zinc is consumed with the formation of no dross and residue and the process can be quickly started, as there is no large quantity of metal to be heated.

The different methods are described as follows:

Galvanizing by dipping in a bath of molten zinc was commenced as early as [illegible]

The theory of the process is the immersion of the article after the removal of all scale, oxide, and grease in a bath of molten zinc varying in temperature from the melting point to 800 degrees F. according to the thickness of the coating desired and the nature of the work under treatment; the higher the temperature the thinner the coating and vice versa, but this method of control has its disadvantages, as the higher the temperature the more zinc combines with the iron to form dross which has to be removed from time to time. It is, therefore, generally customary to run the temperature as low as possible, and remove the excess zinc by shaking; or, if the articles are of suitable construction, by passing them between rollers.

The electrolytic process of coating iron and steel with zinc, although comparatively recent, has been brought to a very high degree of perfection. The articles to be coated are suspended in a bath of a zinc salt and form the cathode of an electrolytic cell. The thickness of the coating is, therefore, dependent on the length of time and current density.

In the process of "Sherardizing" or dry galvanizing, the iron after having the scale removed is placed in a closed iron receptacle charged with zinc dust which can be kept stationary or rotated. The contents of this drum are heated from 500 degrees F. to 600 degrees F. for varying lengths of time, from thirty minutes to several hours, according to the nature of the work under treatment. The drum is then cooled and the articles removed. Although Mr. Cowper-Coles emphasizes that the temperature employed is below the vaporizing point of solid zinc, it appears that the temperature is sufficiently high so that the zinc dust employed commences to vaporize, and it would, therefore, appear that "Sherardizing" is to some extent a vapor process.

The process of "Sherardizing" or vapor galvanizing is distinct from the others in that the articles coated with zinc are not brought into contact with molten zinc or any of its compounds, but are placed in a separate chamber into which zinc vapor is passed. The articles to be treated are placed in a wire cage which is rotated inside an outer cylinder of wrought iron in which the metallic zinc is heated by means of gas or electricity to a temperature sufficiently high to volatilize it. The apparatus is kept filled with hydrogen gas which has a very beneficial effect on the color and adherence of the product due to its reducing action. This apparatus is modified to suit different requirements, but in almost all cases it is necessary to move the objects to insure an even coating.

Brass Plated Goods Disturb the Englishman.

The English buyer is apparently beginning to feel the effect of brass plated steel and iron goods on the so called "legitimate" article that has so long been his anchor. Commenting upon the increasing use of brass plated goods in England, a correspondent of an English trade journal says:

"I am probably understanding the case if I say that the introduction of this line of counterfeit goods has depreciated the stock of cabinet brass foundry in the shops of the iron mongers of this country by at least one-half. It is practically impossible to sell decent-class goods in these lines either by the wholesale houses to the trade, or to the public.

"In many instances buyers among the public are victimized into purchasing what they believe to be real brass or copper goods through the salesman not telling them the truth at the time of buying. Is there no way of compelling all vendors of these goods, either wholesale or retail, conspicuously to label the spurious articles as "Bronzed-Iron" or "Imitation"? Such a regulation would, I feel convinced, be greatly appreciated by all honest traders, and do not a little to bring the genuine articles once more into demand, to the great satisfaction of the majority of ironmongers."

The solution would seem simple. If our English friends are so disturbed over the appearance of brass plated goods, let the buyer equip himself with a magnet. It will guarantee results.

Soft solder may be removed from sterling silver by boiling it in a solution of perchloride of iron in water. The silver is not attacked although discolored slightly. The soft solder is slowly but completely dissolved.

Oval Lead Pipes.

An English writer suggests the use of oval lead pipe in place of the customary round shape. The advantage is that the oval pipe will not as readily burst when the water in it freezes. While a correspondent in an English paper claims novelty for the suggestion, it is stated by an authority that "Beautifully cast lead pipes of oval section have been found in the house of Livia among the ruins of the palaces of the Emperors on the Palatine Hill at Rome. Livia was the mother of Tiberius, the third Emperor of Rome, who reigned from A. D. 14 to 37. This case is by no means an isolated one, as lead pipes of oval section have been found in the forum and in other places."

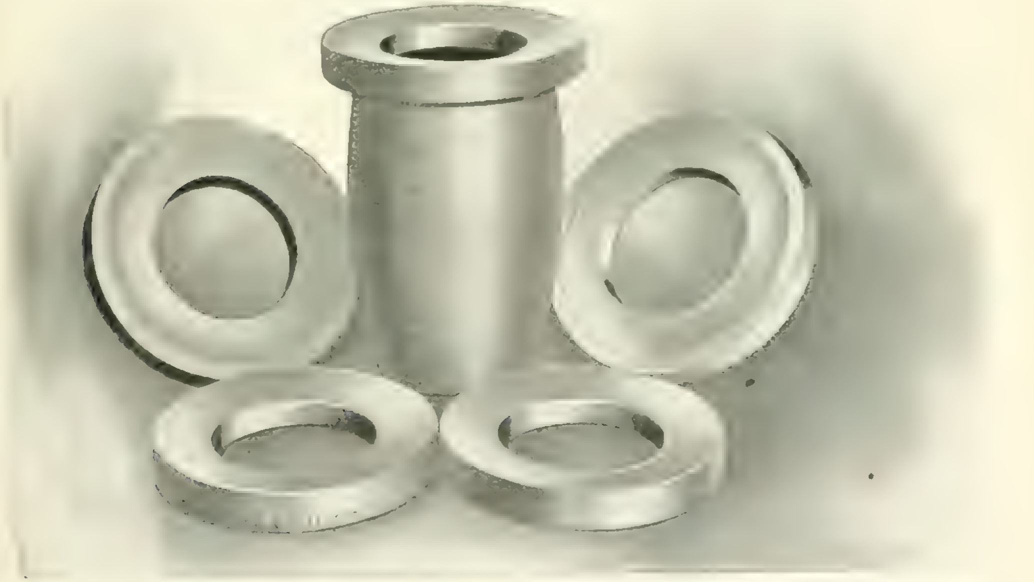
The oval lead pipe is said to "give" more than a round one, but it is quite improbable that the Romans used it for any specific value, and it is possible that the oval shape was produced by the flattening of a round pipe. Lead is so soft that it might readily follow unintentionally.

The Use of the Crucible Ring in Melting.

The crucible ring is one of the crucible accessories recently invented, and while it has been upon the market but a comparatively short time, it has given excellent satisfaction wherever employed.

This unique device consists of a disc of crucible material with a hole through its center the size of the opening of the crucible it is to fit. Its shape may be seen in Fig. 1. It is placed on the top of the crucible in which the metal is melted as shown in Fig. 2. The top of the ring is concave and slopes towards the center of the crucible so that should any metal melt on its surface it would run down into the crucible and not from it.

The object of the crucible ring is to produce a more perfect combustion of the fuel in the melting furnace. The rush of gases in the furnace is impeded and they then burn more completely. The manner in which this is accomplished may be understood by referring to Fig. 3. It has been found that the metal melts more rapidly under such conditions.



The "Waterbury" Crucible Ring for Improving the Combustion of Fuel in a Brass Melting Furnace.

In addition to promoting the combustion of the gases, the crucible ring serves to protect the top of the crucible from injury and thus prolongs its life. It is also useful as a safeguard against scrap falling in the fire. Gates or other similar scrap may be placed in the crucible and if the top happens to melt before the bottom, it will not fall into the furnace, but on the crucible ring and then, after melting completely, it runs into the crucible.

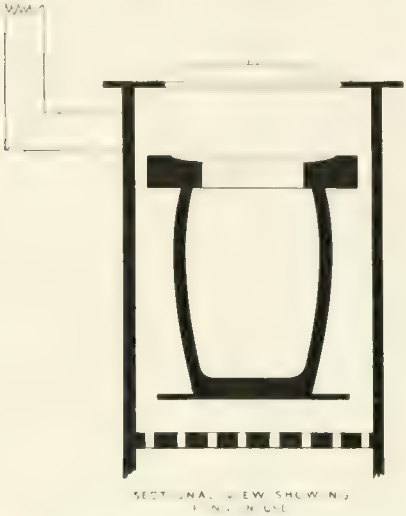


Fig. 2. Showing Manner of Using the Ring.

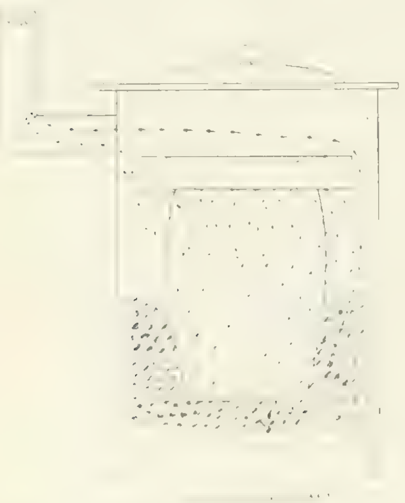


Fig. 3. Illustrating the Draft Feature

The crucible ring is manufactured by the Waterbury Crucible Company, of Waterbury, Conn., who own the patent rights upon it. It is supplied in all sizes to fit any crucible. It is particularly applicable to forced draft furnaces in which the gases are driven from the fuel rapidly.

Difficulties in Alloying Iron and Copper for a Commercial Product.

The alloying of iron and copper is a subject that has received much attention in the past and a large number of experiments have been made upon it. Up to this time no one has succeeded in producing such an alloy as a commercially useful product.

It is a simple matter, when a good furnace is used, to melt iron or steel and copper together. When melted, to all appearances the two metals have alloyed perfectly; but upon casting the molten metal, either in chill or sand molds, hard, steel-like nodules will be found distributed through the metal. It is on this account that the alloying of iron and copper is unsatisfactory and no commercial use has been made of it.

The difficulty in alloying iron and copper lies in the fact that iron takes up carbon, and when this takes place, as it does in the ordinary manner of melting, the copper will not alloy with it in a homogeneous manner. Investigators have found that by using iron free from carbon and melting the iron and copper in a crucible lined with clay or other refractory material containing no carbon, that a perfect and homogeneous alloy of the two metals can be obtained. Such a process, however, is too costly for ordinary use and even though it were not, the alloy seems to possess no properties which would render it useful.

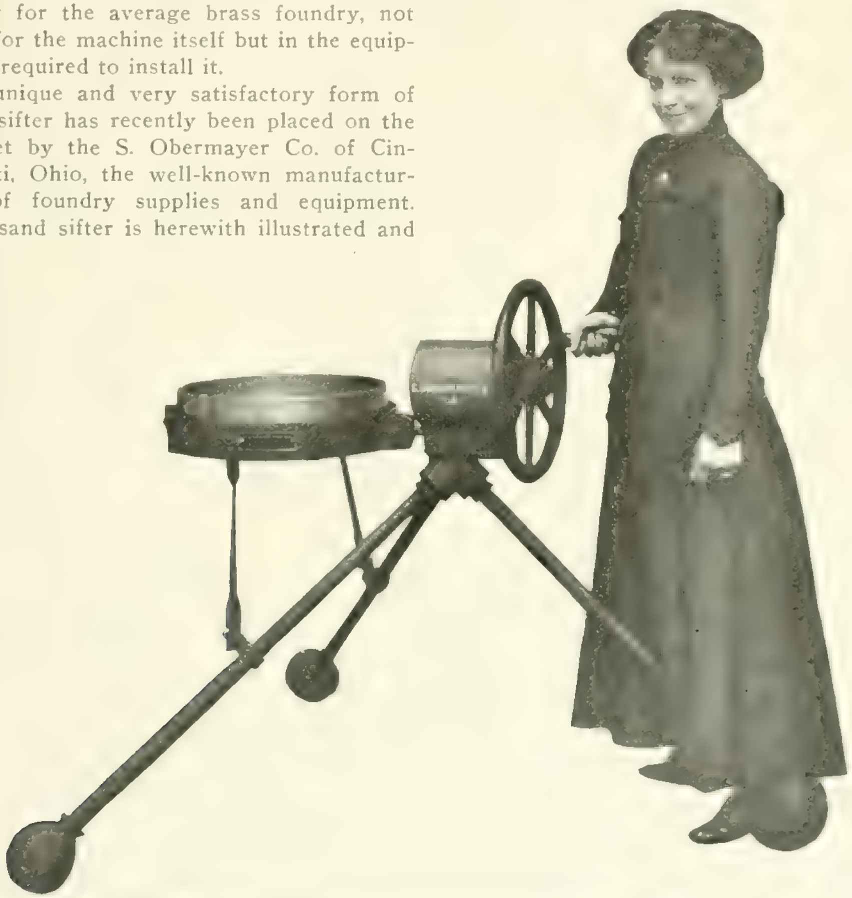
An excess of phosphorus in bronze causes pin-holes in the casting. The ideal condition in the use of phosphorus is when just the right amount is added to the bronze to remove the oxide present in it, and a small quantity only is needed for this purpose. Owing to the fact that the quantity of oxide in copper or bronze is always variable (depending upon the manner of melting, etc.), the amount of phosphorus to be introduced can only be approximated. The same rule holds true of all deoxidizing agents.

The Obermayer Portable Sand Sifter.

Sifting sand by hand in the ordinary way is always a laborious operation and much time and thought have been given the subject in the endeavor to produce an apparatus for doing the work by power. Many large and expensive machines have been devised and are used in large foundries in which power is available, but they are too costly for the average brass foundry, not only for the machine itself but in the equipment required to install it.

A unique and very satisfactory form of sand sifter has recently been placed on the market by the S. Obermayer Co. of Cincinnati, Ohio, the well-known manufacturers of foundry supplies and equipment. This sand sifter is herewith illustrated and is made to work by hand. The machine is constructed upon a new principle and is similar to those operated by compressed air or electricity. An ordinary 18-inch hand sieve is employed and may be quickly changed from a coarse to a fine mesh when desired so as to allow the sand to be riddled to any degree of fineness.

To use the sifter, the hand wheel at the side is revolved. It will readily be noticed that the operator is not required to hold the riddle, nor to exert himself to any extent. When using this machine, the sand can be riddled in one-quarter the time that is consumed in riddling it in the ordinary manner. The machine is also a very useful adjunct to a core room. It is readily moved from place to place and sand in any part of the foundry can thus be riddled.



The "Obermayer" Portable Sand Sifter, Showing Manner of Operating.

When nickel is deposited upon brass its color is whiter and more brilliant than when copper or bronze is used for the base metal.

Brass can be deposited from a plating solution free from ammonia without difficulty and many platers now are accustomed to use such a plating bath as it is apt to give less trouble.

Preserving Iron Patterns from Corrosion.

While it is not generally appreciated that a cast-iron pattern is preferable to one of brass, it is [illegible] a fact that, because [illegible] rusting the iron pattern is [illegible]. For small work, however, cast-iron is not generally used on account of the difficulty of [illegible]. It cannot be [illegible]. For large or single patterns it is extensively employed.

A Canadian foundryman uses the following method of preserving his iron patterns from corrosion and at the same time improving them for general use:

The patterns are first subjected to an air blast to remove dirt and dust and then immersed in a pickle composed of 5 gallons of water and 1 pint of sulphuric acid. This is used hot and the patterns are allowed to remain in it for five minutes. This operation starts the rust.

The patterns are then rinsed in water and dipped into a hot potash solution made by dissolving 1 lb. of potash in 1 gallon of water. The object is to neutralize the acid left in the pores of the iron. The patterns are allowed to remain in the solution for about five minutes.

The next operation is that of scouring with a stiff brush to remove the rust and then again dipping into the sulphuric acid for a minute or so. The patterns are then rinsed in *cold* water and not allowed to dry. They are afterwards immersed in a weak cyanide of potassium solution made by dissolving 2 oz. of the cyanide in 1 gallon of water. They are left in it until needed to keep from rusting.

The patterns are then copper plated in the regular cyanide copper plating solution used by all electroplaters. The solution is used hot as cast-iron receives a better deposit under such conditions. The deposit need not be thick and usually from 5 to 10 minutes are all the time necessary.

The next step is to rinse and dry the patterns, after which they are warmed and paraffine wax rubbed over the surface as a thin coating. When cool, the surface is brushed with a bristle brush in order to smooth down and even the paraffine coating. They are [illegible]. The copper prevents their rusting, while the paraffine serves the double [illegible] of protecting the copper from corrosion, and allowing the pattern to leave the sand easily.

Sand Blasting Nickel Anodes.

Some makers of nickel anodes sand-blast them while others do not, but it is [illegible] good results in the use. When a new anode is cast there is always a hard skin, similar to a [illegible] casting, which is not readily attacked in the nickel solution, and it is only after this skin has been removed that the anode works freely. This accounts for the fact that an anode works better after it has been used for some time.

We have found platers who are accustomed to sand-blast their own anodes, both when they are new and after they have been in use for some time. They find it good practice. The nickel surface is thus exposed in the best possible condition. Not only is a sand-blasted surface clean, but rough, a feature of importance in the use of nickel, as it is not dissolved by the solution as readily as other metals.

Some of the makers of nickel anodes dip them instead of sand-blasting them and this is equally as efficacious. If a plating establishment, however, has the good fortune to possess a sand-blast, it will be found quite advantageous and productive of good results to sand blast the surface of the anodes when they are received, and after they have been in use and are coated with a hard crust. It is a practice followed in some establishments with good results.

The Tinning of Brass Castings.

While the demand for tinned brass castings is not large, they are more or less used. In water meters and similar apparatus, where freedom from corrosion is necessary, they are employed and in other similar devices they are necessary.

The tinning of brass castings is easier than those of cast-iron, steel or malleable iron, but in order to be a successful operation, certain rules must be carefully obeyed. It matters not whether the castings are of yellow or red metal, but if they contain a large quantity of aluminum, the tinning will not be as readily done. A small quantity of aluminum, such as brass founders now add to yellow brass to render it free running, does not seem to interfere with the tinning.

The first operation necessary is to free the castings from sand. This is preferably done by pickling in hydrofluoric acid. Tumbling may also be used, but it is not as satisfactory. It does not remove the sand from corners or holes. A good, thorough pickling is the best method for cleaning.

When the castings have been pickled or tumbled (it is possible, of course, to obtain castings which do not need either operation, but they are not usually produced in practice) they are dipped in an acid dip to brighten the surface and remove all oxide. This dip is composed of the following:

Oil of Vitriol..............	1 gallon
Aqua-Fortis	1 gallon
Common Salt................	1 oz.

If the dip does not "bite" well or leave the surface clean and uniform, add a little water, say a pint, to the 2 gallons of dip. The dip should not work so rapidly as to attack the brass strongly. Too much water will cause it. The castings should come out of the dip with a uniformly bright surface. After dipping, the castings must be thoroughly rinsed in cold and then in hot water. When dried out, they are ready for tinning.

In order to make the tin adhere to the brass a flux is needed. This flux is made by dissolving common zinc, either slab or sheet clippings, in strong muriatic acid until no more will be taken up by the acid. In this manner a strong solution of chloride of zinc is obtained containing no free acid. No water should be used in it.

The brass castings are dipped into the flux until completely covered and then immersed in the molten tin and allowed to remain for a short time. When withdrawn, they should be completely covered with tin and no pin holes or other imperfections must be present. When they are, it indicates imperfect cleaning previous to tinning.

When the brass castings come from the tinning kettle, the surface is not apt to be smooth. If they are dipped singly they are not very rough, but frequently the surface is not what is desired. This is particularly true if the castings have been dipped into the tin in a basket or wired together. Lumps of tin are present on the surface. In order to produce a smooth, bright surface, a second tinning is required, and this is done in another tinning kettle.

The second tinning kettle is one of molten tin, on the top of which is a layer of tallow about half or three-quarters of an inch in thickness. The tallow is used as a flux. The castings are now dipped into the tin contained in this second tinning kettle, and the tallow on the surface serves to smooth it and produce an even and bright coating. The castings are dipped into this second kettle singly, by means of a pair of tongs, and the drop on the bottom is removed by giving the castings a quick "throw" to one side before it cools.

In many instances the use of a second tinning kettle is unnecessary, as it serves only to produce a bright, even coating of tin; but where the best finish is desired, it should always be employed.

An Improved Method of Making Zinc Dust.

An improved method of making zinc dust electrolytically has recently been patented by Sherard O. Cowper-Coles, of London, England (U. S. Patent 923,411, June 1, 1909). The method is as follows:

The solution employed is one of caustic soda, either hot or cold. The anodes are zinc-dross slabs (*i. e.*, zinc from the bottom of galvanizing kettles and containing from 2 to 4 per cent. of iron) and the cathode is a disc of sheet iron. The action of the current dissolves the zinc at the anode and deposits it in a spongy condition on the iron disc. This disc revolves and the spongy zinc is automatically scraped off by a scraper as it rotates. A high current density is employed—several hundred amperes per sq. foot—in order to produce the necessary spongy condition.

The zinc sponge thus obtained is dried; but a reducing atmosphere is required for this purpose in order to prevent oxidation. A muffle filled with illuminating gas may be used. The zinc dust thus produced is used in "Sherardizing" (or dry galvanizing) and the inventor claims it to be superior to the zinc dust of commerce obtained from the flues of zinc distillation furnaces.

Questions and Answers.

QUESTION No. 671. Can celluloid be dissolved in anything so that it can be used as a varnish? What is the composition of celluloid?

Answer. Celluloid is composed of gun cotton (soluble cotton) and camphor. The best solvent for it is acetone. When thus dissolved it can be used as a varnish or lacquer, but the odor of the camphor prevents it from becoming satisfactory in the majority of instances.

QUESTION No. 672. What is the method most extensively used for producing the French-gray finish on silver? Is liver of sulphur generally used?

Answer. By far the greater portion of the French-gray work made is done by liver of sulphur. It is easily used and the results are good. For flat-ware, however, it is open to the objection that it does not produce as lasting a black as that given by platinum, and hence the latter is used to some extent for this class of work.

QUESTION No. 673. Can chromium be alloyed with copper by simple melting? I find that metallic chromium can be purchased at a reasonable price and I desire to make some experiments in alloying it.

Answer. Chromium melts at a considerably higher temperature than platinum and you will not be able to melt it except by means of an electric furnace or the oxy-acetylene blowpipe.

QUESTION No. 674. Kindly let us know, through the columns of THE BRASS WORLD, if there is any metal that we can add to cast-iron which will lower its melting point without adding too much to the cost?

Answer. There is no metal that you can use for this purpose as the cheap metals cannot be alloyed with cast-iron. Lead will not mix with it, zinc volatilizes so readily that it cannot be introduced into molten cast-iron, copper will not answer, and the other low melting metals are too expensive. Tin is the most feasible metal for your purpose as it alloys with iron readily, but it is quite expensive compared with cast-iron and you probably will find it too costly to use.

QUESTION No. 675. Does a silver deposit made by using bi-sulphide of carbon in the silver plating solution (i. e., the so-called bright silver plating solution) tarnish more readily than one obtained in a silver plating solution which contains none? We have heard that such silver tarnishes very readily, but prefer to be correctly informed. The work that we are doing, britannia-metal ware, such as tea pots, sugar bowls, etc., is not lacquered, and we do not desire to put out any goods which are not first class. If the bright silver deposit does not tarnish readily, we believe it would be more convenient for us to use.

Answer. The so-called "bright" silver deposit, made in a silver plating solution that contains bi-sulphide of carbon, tarnishes much more readily than a deposit produced in a solution which is free from it. If you desire a silver deposit that will not tarnish readily you had better not use the bi-sulphide of carbon. Silver from the ordinary silver solution without bi-sulphide of carbon, does not tarnish as soon. You must bear in mind, however, that silver in any form is one of the most easily tarnished metals.

QUESTION No. 676. We are somewhat interested in a process, of which we have heard, for melting brass with mica, and by which it is claimed that the castings are given a higher finish and become non-corrosive. As a subscriber we are interested in the subject as we manufacture water meters and any improvement in the character and non-corrosive properties of our bronzes will be of value. Can you give us any information about the use of mica in melting brass and bronze?

Answer. We are unable to give you any information about the use of mica in brass melting. We fail to understand why it should be of any value for this purpose. It will not melt and remains on the top of the metal in its original condition. The only value that can come from it is as a covering for the metal, and in this respect it would act like sand or other earthy material. It may be possible that it would act beneficially in this respect in keeping the air and gases from coming in contact with the metal; but charcoal is far superior for this purpose, as it has a reducing action on the oxide of copper, and at the same time acts as a covering for the metal and protects it from the products of combustion and the air.

QUESTION No. 677. Would it be practical to use aluminum wire instead of copper in a plating room for conductors and making tank connections? It is cheaper than copper and there would be considerable saving could it be used. What is the electrical conductivity of aluminum compared with copper?

Answer. We cannot recommend aluminum in place of copper for use in a plating room. It is easily corroded and you will then have much trouble from bad connections. Alkaline solutions act upon it readily. It has about two-thirds the electrical conductivity of copper. In other words, if the conductivity of copper be taken as 100 per cent., that of aluminum has been found to be 63 per cent. It is, therefore, a little less than two-thirds that of pure copper.

QUESTION No. 678. We are making some special float balls of copper and rubber. The rubber is used for half of the ball and the copper comprises the other portion. The rubber is held to the copper by a flange so that the two are in actual contact. What will be the action of the copper on the rubber? One of our customers thinks that there will be an action. What is your opinion of the problem?

Answer. Owing to the sulphur used in vulcanizing rubber, it slowly acts upon copper and then becomes rotten. When the conditions are favorable, as they are when the weather is warm, this action is rapid and frequently a few weeks will suffice to bring about the action. We suggest tinning the copper as this metal does not act upon the rubber readily. Neither does aluminum nor nickel. A heavy nickel plating might answer, but we advocate dip tinning as the best method of procedure. The action of rubber on copper is fully realized by the manufacturers of rubber-covered, insulated copper wire. In order to guard against the action of the rubber on the copper, they tin all the copper wire used previous to covering with the rubber compound.

Question No. 679. I have been saving the dross which comes from my nickel anodes when cleaned and now have about 300 lbs. Will you please let me know if it is salable, and who will purchase it?

Answer. The slime which comes from nickel anodes is usually not very salable, although nickel anode makers frequently purchase it. In melting it, the loss is so great that it is usually considered more or less unprofitable. If you cannot sell it to nickel anode manufacturers, we are unable to suggest anyone else. While the material contains nickel, as previously mentioned, it wastes so much in melting that there is little profit in purchasing it unless sold at a very low figure.

Question No. 680. We have occasion to dip quite a lot of brass fittings, valves, etc. The dip we use contains about equal parts of nitric and sulphuric acid, liquid measure, and a small quantity of common salt is used in it. We have varied the dip in the proportions of acid used, and also by adding water. In every case the castings do not come out to suit us. They are dull and do not have the brightness we desire, and our customer is finding fault with them. We send you one of the castings that has been dipped to indicate where the trouble is. Where are we at fault?

Answer. The difficulty seems to be with your castings. An inspection of the one sent us shows that it contains considerable tin and lead (ordinary composition), and when this is the case, a bright surface is difficult to obtain. It is apt to come out of the dip dull and gray. Castings to dip well should be as low in tin and lead as possible, and if you wish to obtain a bright surface on them you will have to make them particularly for dipping. As a usual rule ordinary composition castings of commerce do not dip well, as they contain too much lead. New metals should be used, and if you desire we can give you a mixture for red metal that will dip well.

Question No. 681. What kind of a nickel solution is used in plating in a barrel? The articles to be plated are small and I have been unable to obtain good results with my ordinary nickel solution which stands at [illegible] degrees Beaumé. I do not seem to obtain a deposit. Is there anything I can add to the solution to make it plate?

Answer. The difficulty is with your solution. It is too weak. Add double salts of nickel until it stands 8 or 9 degrees, or in other words, make it as strong as possible. Then add about 2 oz. of sal-ammoniac to every gallon. This will act as a conducting salt and allow the current to pass. It is possible, of course, that your current is not sufficiently strong. Do not fill your barrel too full of work. In some instances it is difficult to plate in a barrel with six volts, and from 8 to 10 are necessary. You had better investigate the matter if your solution does not give you good results after it has been strengthened.

Question No. 685. We have some articles to nickel plate which contain hard rubber or composition discs. The articles are small valves and the discs are used for the seats. Will the nickel solution affect these discs, and if so, will it be injured?

Answer. The discs will not be attacked by the nickel solution and it will not be injured at all. They are made to stand water and are quite non-corrosive.

Question No. 686. Can steel or copper wire be tinned by a mixture of tin and lead and yet have as bright a coating as that produced by pure tin?

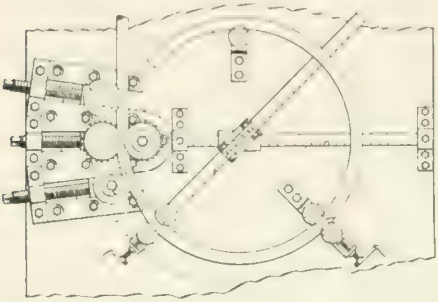
Answer. By employing from 5 to 25 per cent. of lead in the tin you can obtain a coating that is nearly as white as the tin at first, but it tarnishes rapidly. When first coated, however, it has practically the same whiteness as pure tin. If you desire a tin coating that will remain bright we advise using only the pure tin.

Question No. 687. I have a 50 gallon silver solution which I have purchased already made up and fear that it is not good. I wish to plate some brass work and when I put the work in the solution it turns white immediately and then becomes yellow. When I take it out and attempt to polish it, the silver peels off. I have sufficient electric current and find that if I put the brass in the solution without the current that it plates and does not turn yellow, but it does not seem to adhere. Is the solution good?

Answer. Your difficulty lies in the fact that you cannot plate brass in a regular silver solution without first "striking" it in another silver solution used for this purpose. This preliminary solution is called a "strike" and contains considerable free cyanide and little silver. In it the brass will not deposit without the use of the current, and therefore a coating of silver is first obtained in this "strike" after which it is transferred to the regular silver solution, such as you have, and the silver deposited. If the brass is plated as you have attempted to do, it becomes coated with a non-adherent coating of silver before the current acts, but the deposit is not adherent. The use of the "strike" avoids this. The fact that the silver deposit becomes yellow after a time shows that your current is too strong. You will have to use [illegible] if you want a white silver. A current of [illegible] is [illegible] for the purpose.

Patent Abstracts.

928,220, July 13, 1909. PIPE COILING MACHINE. Leopold C. Schneider, of Philadelphia, Pa., assignor to the Philadelphia Pipe Bending Co. A machine for bending pipes and tubes without filling them. The pipe is formed by moving grooved rollers. The machine is made adjustable so that bends of any desired contour may be made on it.

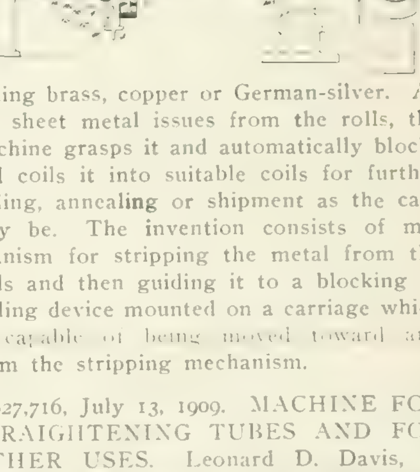


927,076, July 6, 1909. APPARATUS FOR MAKING METAL ARTICLES BY PRESSURE THROUGH DIES. Jorgen Remmen, of Donora, Pa. A machine for extending metal. The metal is forced through a die by means of a hydraulic press in the same manner as ordinarily practiced. The novelty of the invention lies in the form of apparatus used. There are also means for cooling the metal as it issues from the die in order to prevent oxidation. The machine is particularly adapted, the inventor says, for extruding iron and steel. It is claimed that wire can be made in it and also steel rails if necessary.

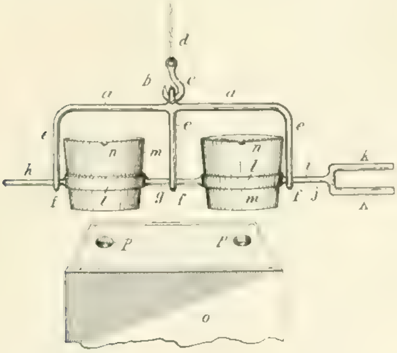
927,999, July 13, 1909. MATCH-PLATE FOR MOLDERS' USE. Edward T. McHugh, of Holyoke, Mass. A match plate for use in molding. The plate carries the patterns and is held securely in its proper position between the cope and nowel parts of a flask during the ramming. By means of a suitable device the plate may be released from the flask after ramming to allow the rapping to be carried out. After this has been done and the flask withdrawn, the mechanism allows the plate to be replaced again in order to ram the other part of the flask.

927,037, July 6, 1909. MACHINE FOR COILING METAL. Edward O. Goss, of Waterbury, Conn., assignor to the Scovill Mfg. Co. of the same city. The machine is attached to a stand of rolls used for cold rolling brass, copper or German-silver. As the sheet metal issues from the rolls, the machine grasps it and automatically blocks and coils it into suitable coils for further rolling, annealing or shipment as the case may be. The invention consists of mechanism for stripping the metal from the rolls and then guiding it to a blocking or coiling device mounted on a carriage which is capable of being moved toward and from the stripping mechanism.

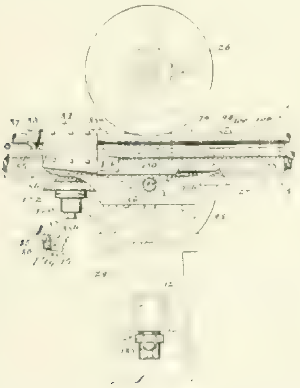
927,716, July 13, 1909. MACHINE FOR STRAIGHTENING TUBES AND FOR OTHER USES. Leonard D. Davis, of Erie, Pa. The machine is applicable for straightening both hot and cold rods or tubes. The straightening is done by means of revolving parts which impart a swaging motion to the rod or tube as it is passed through them.



927,022, July 6, 1909. CARRIER FOR FOUNDRY LADLES. Geo. J. Blackham, of Uniontown, Pa., assignor to the McCrum-Howell Co., of New York City. A device for holding two ladles from a crane so that they can be poured simultaneously. The principle of the device, which is the ladle bail, may be understood from the sketch.

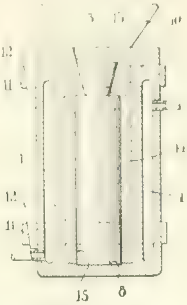


927,036, July 6, 1909. BUFFING MACHINE. John F. Gail, of Kenosha, Wis., assignor to the Simmons Mfg. Co. of the same place. A machine for buffing brass tubing, particularly that used on brass beds. The aim of the inventor has been to make the machine as automatic as possible, and the insertion and removal of the tube to be polished are all that is required of the workman who operates the machine. Either a bright or satin finish may be produced. The tube is turned while it is being polished and also reciprocated so that a finish equal to that produced by hand labor is given the tubing.



928,000 July 13, 1909. MOLDER'S FLASK. Edward T. McHugh, of Holyoke, Mass. The invention is upon an improvement in snap flasks. The feature of the invention is in the corner locks. They are provided with springs so that there is no possibility of accidentally releasing them when the flask is being rammed or carried to the floor from the molder's bench. In other words, the novelty of the patent lies in the spring corner lock.

927,371, July 6, 1909. PROCESS OF MAKING CLAD METAL ARTICLES. John F. Monnot, of New York City, assignor to the Duplex Metals Co. of the same place. A method of making compound metal ingots such as copper coated steel wire. The steel core is inserted in a mold and the metal poured around it. The molten metal is covered with a flux which allows a satisfactory union to be made between the steel core and the copper when the core is drawn out. The inventor states that the flux used acts as a "wiper" and serves to promote soundness in the copper as well as promoting a union between it and the steel.



926,898, July 6, 1909. PROCESS OF SIZING AND SHAPING. Albert F. Rockwell, of Bristol, Conn. The process is applied to sizing and shaping steel articles that are hardened in oil and obviates grinding after hardening. The article, such as ball bearing case, is heated, and a mandrel inserted, after which the whole is immersed in oil. The article then shrinks to the desired size and does not warp or twist as it does when hardened alone.

927,715, July 13, 1909. CASTING LADLE. Daniel Collier, of Birdsboro, Pa. A bottom poured ladle in which the stopper is arranged like a funnel so that should the plunger get out of alignment the funnel portion will not allow it to seat other than in the centre.

Trade Items.

The Bay State Screw Co., manufacturers of screw machine products, have moved from Springfield, Mass., to Hatfield, Mass.

The Baltimore Silver Buckle Co. are starting in the manufacture of buckles, pins and novelties at 800 North Gay Street, Baltimore, Md.

The Mercantile Adding Machine Co. have started to manufacture adding machines at 20 Knight Street, Norwalk, Conn., and have started a nickel plating plant in connection with their business.

Shepard & Gaines is the name of the new firm that has succeeded John Alexander, jobbing electroplater, 105 Trumbull Street, Hartford, Conn. As noted in THE BRASS WORLD, July issue, the same line of jobbing electroplating, polishing, buffing and lacquering will be carried on.

The D. M. Watkins Co. have succeeded D. M. Watkins & Co., 95 Pine Street, Providence, R. I., manufacturer of small metal goods and jewelers' findings. The officers of the new company are F. H. Watkins, president; D. M. Watkins, treasurer, and Earl Williams, secretary. The expansion is for the purpose of taking care of their increased business.

The F. E. Arthur Co., 641 Capitol Avenue, Hartford, Conn., reecntly organized for the manufacture of brass ingot metals, have now commenced melting and are turning out ingot metals for the brass foundry trade. F. E. Arthur was formerly of the firm of Arthur Bros., of East Hampton, Conn., and Suisman & Blumenthal, metal dealers, of Hartford, Conn., are interested in the company.

The Leading Brass & Metal Co., 918 South Thirteenth Street, St. Louis, Mo., are to erect a new brass foundry to take care of their increasing business. This foundry will be 40x100 feet and will have a capacity of 2½ tons of brass, bronze and aluminum castings per day. The company are in the market for new equipment. In addition to brass, bronze and aluminum, manganese-bronze and white-brass automobile castings are made. They are also agents for U. S. McAdamite Metal.

The Howard Mfg. Co. have been organized at Newark, N. J., to manufacture and deal in electroplaters' and polishers' supplies. They are located at 120 Camp Alley in that city and are now fully equipped for business with an extensive line of goods for the trade. Located as they are in one of the largest metal manufacturing centers in the country, they are prepared to supply all the latest equipment and material used in the plating and polishing trades. As evidence of this feature the company is handling a specialty of aluminum dipping baskets which give such good satisfaction in dipping metal goods. Aluminum is not acted upon by the acid dip and the baskets are lighter and harder to use than the [illegible]

The Diamond Metal Stamping Co., of Columbus, Ohio, recently incorporated, are to manufacture metal specialties for window screens and metallic weather strips.

D. R. Child & Co., of North Swansea, Mass., manufacturers of plated buttons and metal novelties, and one of the oldest in the business, have made an assignment. This company was started in 1862.

The New Haven Clock Co., of New Haven, Conn., manufacturers of clocks in great variety, have completed their new five-story building opposite their main plant. This building will be used for the manufacture of nickel plated alarm clocks.

Thomas Butler & Co., 23 Medford Street, Boston, Mass., the well-known junk dealers, have purchased the steamer *Dean Richmond,* which plied upon the Hudson River for many years, and will break it up for the metal it contains.

The Bristol Company, of Waterbury, Conn., manufacturers of the "Bristol" recording instruments and pyrometers, have opened an office in the Frick Building Annex, Pittsburg, Pa., where one of their experts will be located to co-operate with customers in that section. This office will be permanent and known as a branch of their main establishment.

A new departure in the manufacture of watch dials has been made by the Waltham Watch Co. of Waltham, Mass. The dials are finished in a dull white silver finish and the letters are unusually heavy. The object is to render the dial unusually legible. These dials are used more particularly upon watches intended for railroad use.

The White Tar Company, 5 Front Street, New York City, are headquarters for platers' chemicals of all kinds, and are prepared to quote the lowest market prices. Large quantities are a specialty of this .company. They are first hands on blue vitriol of high grade for electroplating, and also a high-grade caustic soda which is equal to potash for cleaning work for plating, but is sold at a less price. They also are headquarters for sal-ammoniac, sulphate of zinc and zinc dust.

The Slade Tubing Co., of Pawtucket, R. I., will move their plant to Rome, N. Y., where a new company with the same name has been incorporated to absorb them. The new company is capitalized at $50,000. Small sizes of brass, copper, German silver and bronze tubing are manufactured. The larger sizes for drawing down are now purchased from the Rome Brass & Copper Co. and for this reason the plant has been moved. The incorporators are Frank Slade, Geo. F. Slade, Barton Haselton, James Spargo and Frank M. Shelley. The plant formerly occupied by the James A. Spargo Wire Co., on Dominick Street, in Rome, will be occupied by the company.

Paynes & Knight have started in the manufacture of sterling silver ware at 727 Sansom Street, Philadelphia, Pa.

The Osborn Mfg. Co., of Cleveland, Ohio, are now making liquid core compounds for brass foundry use.

Coleman E. Adler, 810 Canal Street, New Orleans, La., manufacturing jeweler and electroplater, will move about September 1 to 722 to 724 Canal Street.

The firm of Regan & Kirwin have succeeded the job plating firm of Carney & Bunker, of Lowell, Mass. They are located at 37 Shattuck Street in that city.

The Ideal Plating & Mfg. Co., 722 Sansom Street, S. Zeidman, manager, are now making a specialty of gold plating in the various shades for the manufacturing jewelry trade.

The Maxwell-Briscoe Motor Car Co., of Tarrytown, N. Y., manufacturers of automobiles, are equipping a new brass foundry for the manufacture of brass castings for their own use.

The Republic Metal & Rubber Co., of St. Louis, Mo., have started in business at 1531 North Broadway in that city and will handle scrap metals of all kinds, ingot copper, brass and composition. All the metals needed by the brass foundry will be handled. Morris S. Mayer is the general manager of the company.

The Richter Mfg. Co. have started at 33 Canal Street, Providence, R. I., to manufacture silver deposit ware. The company is composed of Geo. C. and Victor F. Richter, who were formerly with the Gorham Mfg. Co. of that city. Some new and unique designs will be placed on the market for the fall trade.

The name of the Phosphor-Bronze Smelting Company, Limited, of Philadelphia, Pa., has been changed to the Phosphor-Bronze Smelting Company. This change is one in name only and the business remains the same. The plant is located at 2200 Washington Avenue. They were the first in the United States to manufacture phosphor-bronze.

The W. W. Tice Mfg. Co., of Piqua, Ohio, are manufacturing a material called "Ticeoleum" for dressing brass, iron and other metal patterns. It is applied to the patterns and prevents them from sticking to the sand when they are returned for printing. It also prevents rusting and the patterns draw from the sand better than when the bare metal comes in contact with it. It is sold in liquid form.

The Ellwood Ivins Tube Works, Oak Lane Station, Philadelphia, Pa., have several large orders from the Government for tubing to be used on the Panama Canal. They report an excellent trade in cold drawn seamless tubing of large diameters which they are now manufacturing up to 4 inches. Improvements are under way which when completed will enable them to draw tubing of tool steel and low carbon steel up to 6 inches in diameter. Their plant now contains 42 draw benches and covers two acres of ground. The orders now on hand will run their works to the full capacity for the next six months.

The Hanover Wire Cloth Company, of Hanover, Pa., are buuilding an addition to their plant.

The Wyoming Cutlery Co., of Wilkesbarre, Pa., have bought out the Ruggles Plating Co. of that city and are operating it in connection with their own business

The Badger Motor Car Co., of Columbus, Wis., recently incorporated for the manufacture of automobiles, have purchased 20 acres of land in that place and the erection of a plant will at once be commenced.

The German factory of the New Departure Mfg. Co., of Bristol, Conn., manufacturer of bells, coaster brakes and similar goods, has been discontinued and the machinery is being shipped to England where a new factory will be built.

The Vanguard Mfg. Co., of Joliet, Ill., manufacturers of automobile spark plugs, bumpers and brass wind shields, are erecting a new concrete factory 60x260 feet. A new brass foundry is also to be added to the plant for making brass casting used on their product.

The Allen-Schofield Co. have started at 1853 St. James Street, Montreal, Canada, to manufacture metal specialties such as builders' hardware, etc. They are carrying on electroplating in connection with the manufacture of their goods.

The firm of J. B. Chapman & Co., 51 Taylor St., Springfield, Mass., brass founders and coppersmiths, and who have been in business for about 15 years, has been dissolved. The business will be continued by Thomas J. Rider, who was formerly the manager. The other partner, Mr. Chapman, has retired on account of ill health.

The Rockwell Furnace Co., 26 Cortlandt Street, New York City, are sending out to the trade their extensive catalogue of furnaces and furnace equipment for melting, annealing, brazing, heating, enameling, hardening, etc. This catalogue shows a large number of illustrations of the variety of furnaces made by them.

The Lancaster Silver Plate Co., of Lancaster, Pa., manufacturers of gold and silver plate novelties, have gone into the hands of a receiver. The receivers are A. H. Rosenstein, the president of the company, and John A. Nauman. The assets of the company are placed at $49,713.13 and the liabilities at $34,901.33. Inability to raise money to pay the obligations is assigned as the cause of the difficulty.

The S. Obermayer Company, of Cincinnati, Ohio, the well-known manufacturers of foundry supplies, desire to call attention to their advertisement in this issue. By sending in the coupon attached to the advertisement, an interesting and valuable brass foundry catalogue will be sent to any address, and also a useful book entitled "The [illegible] Compound," by Paul R. Ramp[illegible]. The offer should be accepted by all brass founders and others interested in this line as both books contain valuable information.

The Hatch Lamp Co., of Rogers, Ark., are equipping a plant in that place for the manufacture of electric lamps.

The Milwaukee Aluminum Mfg. Co., Reed and South Pierce Streets, Milwaukee, Wis., are to build a two-story brass foundry of brick and 50x150 feet.

The Howler Mfg. Co., of Montgomery, Ala., manufacturers of gas and alcohol stoves, etc., will move to Cleveland, Ohio. A factory has been secured at 5109 Euclid Avenue.

The International Acheson Graphite Company, of Niagara Falls, N. Y., are enlarging the capacity of the Canadian works at Niagara Falls, Canada.

The property which the Homer Brass Works, of Philadelphia, Pa., has occupied for some time at Water and Mifflin Streets, under lease has now been purchased by them. The company state that no improvements are contemplated at present.

A new four-story addition, 60x70 feet, is being completed by the McKinney Mfg. Co., of Pittsburg (N. S.), Pa. This company are manufacturers of builders' hardware, such as hinges, butts and hasps, and also carry on electroplating.

The Noiseless Typewriter Co. have acquired the factory of the old Keating Bicycle Co. at Middletown, Conn., and more recently occupied by the Eisenhuth Co., mannfacturers of automobiles, and will manufacture typewriters there.

The plant of the Climax Specialty Co., of Seneca Falls, N. Y., manufacturers of plumbers' brass goods, will be moved to Schenectady, N. Y., where additional facilities for manufacturing will be had. The line of manufacture will then be increased as many new plumbing specialties of brass will be made.

The consolidation of the Chapman Valve Co., of Indian Orchard, Mass., and the Pratt & Cady Co., of Hartford, Conn., both large manufacturers of valves, is under way, but has not yet been made public. The product of the two companies is practicaly the same and both iron and brass goods are manufactured. Both companies conduct large brass foundries

The Hendee Wire Brush Co. and the Hendee-Katz Brush Co., of Milwaukee, Wis., brush manufacturers, have been taken over by a new company called the Colonial Brush & Mfg. Co., organized for this purpose. The location is at 348 Florida Street and new machinery has been installed. Scratch brushes, bristle brushes and a full line of regular brushes are manufactured.

The Nichols & Langworthy Machine Co., of Hope Valley, R. I., manufacturers of machinery and also brass and aluminum founders, have gone into the hands of a receiver. Their plant was recently destroyed by fire with a loss of $20,000. Henry B. Segar, of Westerly, R. I., has been appointed receiver. This company recently decided to abandon their location in Hope Valley and, it is stated, determined to locate in New London, Conn.

The International Lead Company are erecting a new factory at Bayonne, N. J., for the manufacture of lead pipe.

The Standard Typewriter Co. have been incorporated at Groton, N. Y., with a capital stock of $1,000,000 to manufacture typewriters.

The Unigraph Register Co., of Jersey City, N. J., has obtained a factory site in Millville, N. J., and are to erect a new plant for the manufacture of their product.

A brass foundry will be erected in the near future by the Illinois Pump & Brass Co., of Peoria, Ill., recently incorporated to manufacture pumps and pumping equipment.

The Cadillac Motor Car Company, of Detroit, Mich., has been acquired by a new concern called the General Motors Company, and will be operated by them. The capital stock of the new company is $5,000,000.

The Weidlich Bros. Mfg. Co., Sterling and Noble Avenues, Bridgeport, Conn., manufacturers of gold and silver plated novelties, have purchased a plot of land in the east end upon which a new factory will be erected.

The Garwood Bronze & Iron Works, recently incorporated at Garwood, N. J., to manufacture iron, brass, bronze and aluminum castings, are also to install a department for nickel plating and japanning.

The Union Switch & Signal Co., of Swissvale, Pa., are now equipping a new brass foundry for manufacturing their own brass castings. This company manufactures railroad signals and switches and now employs nearly 1,200 hands.

The Nernst Lamp Co., of Pittsburg, Pa., was released from the receivership, under which it has been operated for some time, on July 24. This company manufactures electric lamps and is one of the so-called Westinghouse companies and went into the hands of a receiver at the same time.

The smelting and refining business conducted by Henry K. Fort, 2223 North American Street, Philadelphia, Pa., has been incorporated with a capital stock of $10,000. The name of the new company is the Henry K. Fort Company and metals, drosses and oxides are smelted and refined.

The Colonial Steel Company, of Pittsburg, Pa., have discovered a process of welding copper and steel and the experimental work upon it has been finished and the product will shortly be made commercially. Both copper coated wire (both trolley and telephone wire), sheet metal and rods will be manufactured.

The Electric Vehicle Co., of Hartford, Conn., which went into the hands of a receiver some time ago, have been taken over by the Columbia Motor Car Company, incorporated, with a capital stock of $3,000,000, for this purpose. The manufacture of automobiles will now be pushed and the output will be much larger than in the past. This company owns the Selden patents under which the majority of the high-priced automobiles are manufactured.

The Metal Perforating Co. has started in the business of solder cutting at 151 Pine Street, Providence, R. I.

The F. W. Gault, Jr., Brazing & Mfg. Co., has been incorporated at Louisville, Ky., with a capital stock of $15,000.

The Rider-Lewis Motor Car Co. are building a large factory at Anderson, Ind., to manufacture automobiles.

The Standard Machine Screw Company, of Cleveland, Ohio, manufacturers of machine screws and screw machine products, have gone into the hands of a receiver.

The De Luxe Motor Car Co., of Detroit, Mich., automobile manufacturers, have been purchased by the Everett-Metzgers-Flanders Co., of the same city.

Hanlon & Thornton, of North Attleboro, Mass., manufacturing jewelers, are to move to Woonsocket, R. I., where a site has been purchased.

The Western Motor Works Co., of Logansport, Ind., have installed a complete plant for welding aluminum castings in the form of crank cases, etc.

The Garlock Auto Specialty Co. has been organized at Palmyra, N. Y., with a capital stock of $10,000 to manufacture automobile specialties.

The Crane-Best Company, recently formed by the absorption of the Best Mfg. Co., of Pittsburg, Pa., by the Crane Co., of Chicago, Ill., is building a new valve plant at Oakmont, Pa.

The Powers Burglar Proof Sash Lock Co have been incorporated at Hastings, Neb., to manufacture a new sash lock, and manufacturing will shortly be commenced. Dies and tools are now being made.

The Warner Bros. Co., of Bridgeport, Conn., manufacturers of corsets and corset hardware, are to enlarge their plating departments by extensive additions which will give them much needed facilities for manufacturing the small metal goods which are produced by them.

The new plating room of the Beaton & Corbin Mfg. Co., of Southington, Conn., manufacturers of ceiling plates, contains plating tanks, with a capacity of 500 gallons of copper and 700 gallons of nickel solution. The old plating room will be used for polishing.

The Mackenzie-Walton Co., of Providence, R. I., manufacturers of small sizes of seamless wire and tubing for manufacturing jewelers' use, have moved to 478 Pawtucket Avenue, Pawtucket, R. I., where a new and modern factory has been built and equipped for the manufacture of their products.

The business of the Recording Cash Register Co., of New Haven, Conn., manufacturers of registers, which has been in the hands of a receiver, has been sold to a new company called the Recording Register and Fare Box Co., capitalized at $30,000. This company will occupy a portion of the factory of the Pfleghar Hardware Specialty Co., on Winchester Avenue, New Haven, Conn

The Wagner Adjustable Drop Light Co. has been organized at Connersville, Ind., to manufacture a gas light bracket.

The Eagle Crucible Steel, Brass & Iron Foundry of Chester, Pa., are now manufacturing castings of these metals for the trade.

The Thomas Carbureter Co. has been incorporated at Middlesburg, N. Y., to manufacture automobile carbureters and supplies. The capital stock is $500,000.

The Carborundum Company, of Niagara Falls, N. Y., manufacturers of carborundum products, will shortly commence operations on new buildings that will practically double their plant. The new buildings will be used for making carborundum paper and cloth.

The first scales of heavy capacity were recently turned out of the new factory of the E. & T. Fairbanks Company at Sherbrooke, Canada. This factory is a branch of that in St. Johnsbury, Vt., and both scales and valves are manufactured in it.

Personal.

J. F. Hubbs has taken charge of the finishing department in the plant of the Morreau Gas Fixture Co., 347 Erie Street, Cleveland, Ohio.

Frederick St. Lawrence has been appointed general manager of the Hampden Machine Screw Co., of Springfield, Mass., manufacturers of screw machine products.

The newly appointed Minister to China, Charles R. Crane, of Chicago, Ill., is the first vice-president of the Crane Company of that city, the largest manufacturers of valves in the United States.

Charles O. Lambert, who for many years has been superintendent of the Jennings Bros. Mfg. Co., of Bridgeport, Conn., manufacturers of art metal goods, is now identified with the Art Metal Novelty Co., of Meriden, Conn., as general manager.

Joseph W. Marsh, formerly vice-president and general manager of the Standard Underground Cable Co., of Perth Amboy, N. J., manufacturers of copper and brass wire, has been elected president of the company to succeed the late Mark W. Watson.

E. B. Miller, who for many years has had charge of the plating department of the North & Judd Mfg. Co., of New Britain, Conn., manufacturers of saddlery hardware, has resigned his position, and has accepted a similar position with the P. & F. Corbin Co., of that city, hardware manufacturers.

Walter C. Allen, who for a number of years has been general superintendent of the works of the Yale & Towne Mfg. Co., of Stamford, Conn., has been made general manager of the company in place of Kirk Brown, who recently resigned to enter other lines of business. Joseph A. Horne, who has been assistant superintendent of the works, has been made general superintendent.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Acetone, pure, 98-99%	℔.	.22
Acid, Acetic, pure, 30%	℔.	.07
Acid, Arsenious (White Arsenic)	℔.	.20
Acid, Benzoic	℔.	.55
Acid, Boracic (Boric), pure	℔.	.12
Acid, Hydrochloric, see Acid, Muriatic		
Acid, Hydrofluoric, 30%	℔.	.04
Acid, Hydrofluoric, 50%	℔.	.10
Acid, Muriatic, 20°	℔.	.02
Acid, Muriatic, c.p., 20°	℔.	.07
Acid, Nitric, 38°	℔.	.05⅝
Acid, Nitric, 40°	℔.	.05⅞
Acid, Nitric, 42	℔.	.06¼
Acid, Nitric, c.p.	℔.	.08
Acid, Sulphuric, 66°	℔.	.01¾
Acid, Sulphuric, c.p.	℔.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	℔.	.04
Aluminum, Sulphate	℔.	.06
Aluminum, Metallic, in ingots	℔.	.24
Aqua Fortis, see Acid, Nitric.		
Ammonia Water (Aqua-Ammonia), 20°	℔.	.04¾
Ammonia Water (Aqua Ammonia), 26	℔.	.06¼
Ammonia Water, c.p.	℔.	.08
Ammonium Carbonate, lump	℔.	.15
Ammonium Chloride (Sal-Ammoniac)	℔.	.12
Ammonium Hydrosulphuret	℔.	.30
Ammonium Sulphate	℔.	.07
Ammonium Suphocyanate	℔.	.50
Amyl Acetate	gal.	1.85
Antimony	℔.	.08¼
Antimony Chloride (Butter of Antimony)	℔.	.23
Arsenic, Metallic	℔.	.15
Arsenic, White (Acid Arsenious)	℔.	.20
Argols, White (Cream of Tartar)	℔.	.31
Asphaltum, Commercial	℔.	.05
Asphaltum, Egyptian (Bitumen)	℔.	.30
Benzine	gal.	.20
Benzol, Pure	gal.	.75
Bismuth, Metallic	℔.	1.75
Bitumen, see Asphaltum.		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	℔.	.10
Borax Glass	℔.	.35
Cadmium, Metallic	℔.	.75
Carbon Bisulphide	℔.	.10
Calcium Carbonate (Precipitated Chalk)	℔.	.10
Chrome-Green	℔.	.50
Copper, Lake (cask)	℔.	.13¾
Copper, Lake (carload)	℔.	.13½
Copper, Electrolytic (carload)	℔.	.13
Copper, Electrolytic (cask)	℔.	.13¼
Copper (Casting (carload)	℔.	.13
Copper, Casting (cask)	℔.	.13¼
Copper Acetate (Verdigris)	℔.	.35
Copper Carbonate, dry	℔.	.25
Copper Sulphate (Blue Stone)	℔.	.09
Copperas, see Iron Sulphate.		
Corrosive Sublimate, see Mercury Bichloride.		
Cream Tartar, see Potassium Bitartarate.		
Cryolite	℔.	.12
Cyanide, see Potassium Cyanide.		
Dextrin	℔.	.15
Emery Flour	℔.	.04
Emery, F F & F F F	℔.	.03
Flint, powdered	℔.	.01
Fluor Spar	℔.	.01¼
Fusel-Oil	gal.	1.75
Gelatine, Nelson's	℔.	1.15
Gold Chloride	dwt.	.60
Gum Copal	℔.	.30
Gum Damar	℔.	.30
Gum Elemi	℔.	.70
Gum Guiacum	℔.	.26
Gum Mastic	℔.	.70
Gum Sandarac	℔.	.35
Gum Shellac, brown	℔.	.50
Gum Shellac, white	℔.	.60
Iron Perchloride	℔.	.25
Iron Sulphate (Copperas)	℔.	.05
Lead Acetate (Sugar of Lead)	℔.	.15
Lead Pig	℔.	.04⅜
Lead Red	℔.	.12

Lead, Yellow Oxide (Litharge)	℔.	.12
Liver of Sulphur, see Potassium Sulphide.		
Manganese, Ferro, 80%	℔.	.10
Manganese, Metallic, pure	℔.	.75
Magnesium, Metallic	℔.	1.25
Mercury Bichloride (Corrosive Sublimate)	℔.	.93
Mercury, Metallic (Quick Silver)	℔.	.89
Mercury Nitrate	℔.	1.50
Mercury Oxide, yellow	℔.	1.80
Nickel and Ammonium Sulphate (Double Salts)	℔.	.16
Nickel Carbonate, dry	℔.	.60
Nickel Chloride	℔.	.50
Nickel, Metallic	℔.	.47
Nickel Sulphate (Single Salts)	℔.	.25
Nitre (Saltpetre), see Potassium Nitrate.		
Oil, Palm	℔.	.08
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	℔.	.15
Pearlash, see Potassium Carbonate.		
Phosphorus, yellow	℔.	.40
Phosphorus, red	℔.	1.10
Pitch	℔.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	12.50
Platinum, Metallic	oz.	23.50
Potash-by-Alcohol, in sticks	℔.	.50
Potash, Caustic (Potassium Hydrate)	℔.	.08
Potassium Bichromate	℔.	.14
Potassium Bitartarate (Cream of		
Potassium Carbonate (Pearlash)	℔.	.10
Potassium Chlorate	℔.	.15
Potassium Cyanide	℔.	.25
Potassium Iodide	℔.	2.25
Potassium Nitrate (Nitre or Saltpetre)	℔.	.10
Potassium Permanganate	℔.	.17
Potassium, Red Prussiate	℔.	.60
Potassium, Yellow Prussiate	℔.	.24
Potassium Sulphide (Liver of Sulphur)	℔.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	℔.	.70
Tartar)	℔.	.31
Pumice, Ground	℔.	.05
Quartz, Powdered	℔.	.01
Rosin, Yellow	℔.	.04
Sal-Ammoniac, see Ammonium Chloride.		
Sal Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Fine	oz.	.53
Silver Nitrate, crystals	oz.	.50
Soda-Ash	℔.	.05
Silver Fine	oz.	.50⅞
Sodium Biborate, see Borax.		
Sodium Bisulphite	℔.	.15
Sodium Carbonate (Sal-Soda), crystals	℔.	.02
Sodium Hydrate (Caustic Soda)	℔.	.05
Sodium Hydrate (Caustic Soda) by Alcohol (in sticks)	℔.	.45
Sodium Hyposulphite ("Hypo")	℔.	.04
Sodium, Metallic	℔.	.90
Sodium Nitrate	℔.	.05
Sodium Phosphate	℔.	.09
Sodium Silicate (Water Glass)	℔.	.04
Soot, Calcined	℔.	.15
Spelter, see Zinc.		
Spermacetti	℔.	.40
Sugar of Lead, see Lead Acetate.		
Sulphur (Brimstone), in lump	℔.	.05
Tin Chloride	℔.	.43
Tin, Metallic	℔.	.29½
Turpentine, Venice	℔.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water-Glass, see Sodium Silicate.		
Wax, Beeswax, yellow	℔.	.45
Wax, Carnauba	℔.	.70
Wax, Japan	℔.	.20
Whiting (Ground Chalk)	℔.	.02
Zinc Carbonate, dry	℔.	.19
Zinc Chloride	℔.	.12
Zinc Sulphate	℔.	.06
Zinc (Spelter)	℔.	.05⅞

THE BRASS WORLD AND PLATERS' GUIDE

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The Increasing Use of Aluminum and its Effect on Scrap Composition.

Some wise individual predicted at the beginning of what might be called the "aluminum era" that sooner or later brass foundries would feel the effect of the extensive use of aluminum in the scrap metals which they purchase. The time seems to have arrived. On all sides the cry is heard that aluminum is spoiling the scrap metal market.

In a lot of scrap composition which a brass founder may buy, the aluminum castings or other forms of this metal may be easily removed. As a matter of fact, the scrap metal dealer probably has removed it himself. It is a simple operation. Aluminum that is contained in the castings, however, cannot be removed, nor can it be detected except by melting or chemical analysis.

There is so much aluminum used in making yellow brass castings and so much manganese-bronze made (which, of course, contains aluminum) that it is a simple matter to understand why aluminum should find its way into scrap composition. Yellow brass chips may be used as a portion of the ingredients in making composition. Manganese-bronze is so similar in color that it is often difficult to ascertain whether it is bronze or composition, and there are many other ways in which aluminum may find its way into the metal. It makes no difference how it enters the composition, the effect is the same.

The effect of small quantities of aluminum is particularly noticeable in composition mixtures used for plumbers' brass goods, valves, gas cocks, etc. It causes them to leak under pressure. Even a small percentage seems to bring this about. Not, perhaps, in rendering all the castings imperfect, but by causing a far greater percentage to leak than would be considered normal.

It is quite probable that aluminum will cause even more trouble in the future than at the present time, on account of the increase in its use. The problem of the presence of aluminum in composition scrap and chips has become so annoying that a number of valve manufacturers, who have, in the past, been large purchasers of this kind of scrap material, are seriously considering abandoning its use entirely and employing new metals exclusively. It is their belief that the presence of aluminum in the scrap metals that they use, is responsible for the abnormal percentage of leakages in their castings.

Metallic Molybdenum and its Properties.

As it is now possible to obtain metallic molybdenum in massive form and inasmuch as it has entered the steel industry as an ingredient of special steels, there is a strong possibility that it will eventually prove of value in the production of non-ferrous alloys of peculiar properties. Up to the present time, it has not been used in them.

Massive molybdenum, as now found on the market, is made by reducing the oxide by metallic aluminum. The process is known as an "aluminothermic" one. The reaction between the oxide of molybdenum and the aluminum generates sufficient heat to melt the metallic molybdenum formed.

Molybdenum is a grayish-white metal, as malleable as iron and may be worked hot. It is not oxidized in the air, except after a long time. It is not attacked by sulphur. Molybdenum is not hard and may be filed or polished with ease. When pure it does not scratch glass, although when it contains carbon it is hard enough to do so. The specific gravity of molybdenum is 9.01. It will be noticed, therefore, that it is heavier than copper but lighter than silver. It is about half way between the specific gravity of zinc and silver. The melting point of molybdenum is high and exceeds that of platinum. It is, however, of less fusibility than titanium or vanadium.

Large vs. Small Brass Plating Solutions.

Platers invariably make a mistake in using a small brass solution for any length of time. To be sure, there are many instances in which one is made up for occasional use, or for experimental purposes, and then the plater is justified in using it; but for regular use the solution should be made as large as possible.

The reason for the necessity of using large brass solutions is the fact that, no matter how well it may be made up, or how many anodes may be used, the brass is *not* drawn from the anodes in the same proportion it is deposited. This is particularly true of solutions that are worked "Hard" (i. e. with a strong current or by plating large quantities of work in them). The metal soon becomes exhausted from the solution and requires replenishing. If a small brass solution is used, the metal becomes exhausted much more rapidly than in a large one.

The exhaustion of the metal from a brass solution would naturally seem to be a simple thing to overcome by the introduction of copper and zinc salts, and so it is, but this is not the solution of the problem. When the exhaustion commences, the copper and zinc are not exhausted in the same proportion but in variable ones. The result is the changing of the color of the brass deposit. It is this feature that renders the use of large brass solutions so necessary. They do not become exhausted as rapidly as small ones, and when they begin to become impoverished in metal, the color of the brass changes so gradually that it can be promptly adjusted. In the small solution, the color may change quite abruptly.

According to M. Berthelot, the celebrated French chemist, the name "Bronze" was derived from Brundisium, the place where bronzes were made in ancient times. In a manuscript of the eleventh century he found a quotation from Pliny the Elder in which the term "Brundisium Brass" is mentioned. In another manuscript written during the reign of Charlemagne the terms, *de [illegible] brundisii* and *compositio brundisii* were discovered. M. Berthelot assumed, therefore, that the term bronze is a corruption of the word *Brundisium*.

Notes on the Care of Crucible Furnaces and Character of Fire-Brick to be Used in Them.

The ordinary crucible furnace using coke or hard coal for fuel seems such an unimportant matter and gives so little trouble in a brass foundry, that less attention is paid to repairing it than is frequently good for it. As long as it melts, little attention is paid to it, and without regard to the consumption of fuel. It is not an uncommon thing to find furnaces that have been used several times longer than they should, and while one might naturally think that no harm could be done as long as the iron or steel shell is not affected, it is nevertheless true that the injury is in the financial loss which occurs through waste in fuel.

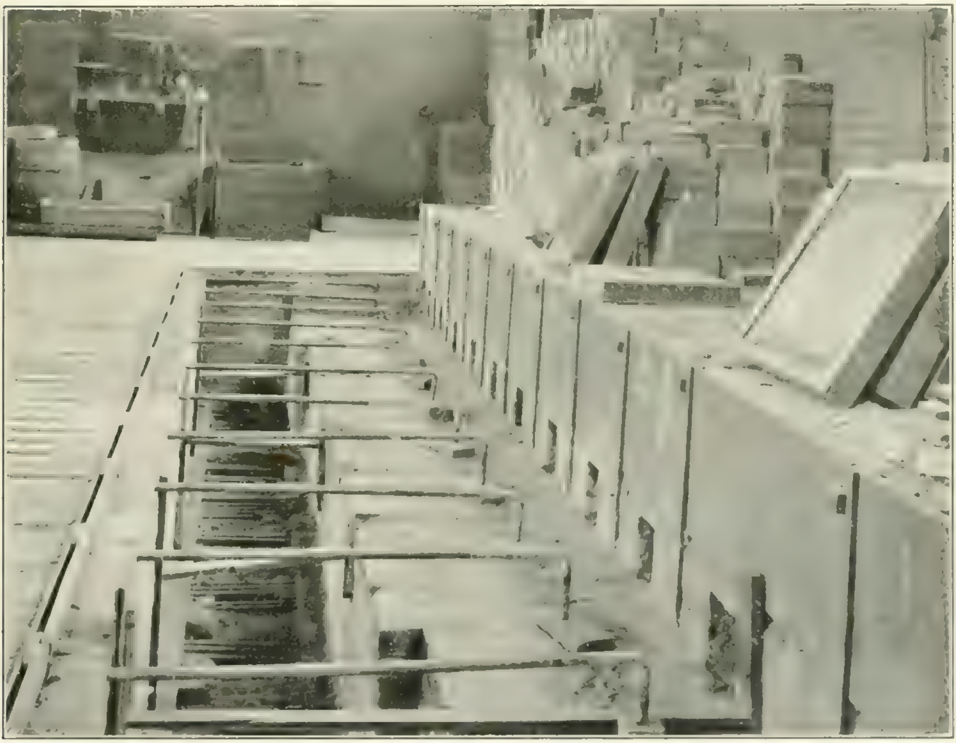


Fig. 1. Crucible Furnaces Torn Out Ready for Re-Lining and Indicating How Cheap Fire Brick can be Used for Lining Parts of Them.

The object of the fire brick is to protect the shell, and as long as it does it, this part of the foundry practice is fulfilled. The real injury is to the fuel pile. A furnace that is burned out so that the fire-brick has become fluxed away from the body of it, takes much more coal than one which is newly lined. If reference is made to Figs. 2 and 3, the wisdom of this argument may be seen. In Fig. 2 a sketch of a brass melting furnace in normal condition is illustrated. In Fig. 3 it is shown after having been used for some time and the body burned or fluxed away. It will be seen that the amount of fuel used in the burned out furnace is considerably more than in the case of the newly lined one.

In addition to the quantity of fuel used in a burned out crucible furnace, the ragged cavity around the body of it is apt to hold the crucible tenaciously, so that when attempts are made to lift it out with tongs, it becomes a much harder operation than usual. Again, so much fuel is used that a far greater fuel falls to the bottom when a crucible has been removed, and the result is the accumulation of so great a quantity in the bottom that not only is the crucible raised up higher than is consistent with good melting, but the draft is impeded on account of the difficulty the air finds in penetrating the mass. It will be appreciated, therefore, that a burned out crucible is not only wasteful in fuel, but interferes indirectly with the draft and the removal of the crucible.

When one calculates the amount of fuel that a burned out furnace consumes in excess of the necessary quantity, it will soon be realized that it is far cheaper to make repairs often so as to keep the consumption at the normal quantity. In the crucible furnaces shown in Fig. 1 which were of the square type used in the brass rolling industry, the fire-bricks were allowed to burn out until one furnace nearly connected with the other. Actual tests showed that the consumption of fuel was from 25 to 30 per cent greater than in the new furnace or those recently lined. From the standpoint of economy it is bad shop practice to allow such a condition to take place, and it is believed no further remarks are required to indicate the strength of the argument.

The Quality of Fire-Brick.

Much ignorance about the proper quality of fire-brick for lining crucible furnaces exists in the brass foundry trade. To many, a fire-brick is a fire-brick and no attention is paid to the matter. Others make an attempt to obtain fire-brick of high infusibility. The question is easily solved when one takes time to consider the problem.

In the first place, the heat of a crucible furnace used for brass melting is not particularly high when comparison is made with a Siemens regenerative furnace, or others capable of producing high temperatures for steel melting. To be sure, a red brick cannot be used, nor a regular fire-brick of low fusibility; but a mistake is made, in selecting a fire-brick for crucible furnace lining, to believe that a refractory property is all that is required. As a general thing, this is really of secondary consideration. Nearly all commercial grades of fire-brick are sufficiently refractory, as far as fusibility is concerned, to stand the heat of the ordinary crucible furnace employing coke or coal for fuel and without the use of a forced blast. Even a forced blast does not increase the temperature very much. It simply supplies, in instances of poor natural draft, a sufficient quantity to give the same results as that obtained in a furnace of good natural draft. If this amount is exceeded it is soon noticeable in the waste of metal and in the rapidity with which the fuel burns out.

The principal requirement of a fire-brick to be used in crucible melting furnaces employing coke or coke for the fuel, is a property to resist the fluxing action of the ash of the fuel. In addition to this, the necessary infusibility must be possessed although, as previously remarked, it is not as paramount as generally believed.

The ability to resist the fluxing action of the ash of the fuel is, by far, the most important requirement in fire-brick for crucible furnace use; and this necessary property is taken into consideration by but few users of brass melting furnaces. Let it be understood why this property is so necessary.

When coke or coal burns, a certain quantity of ash is produced. This ash consists of silica, lime, oxide of iron, alumina, magnesia, soda and small quantities of other substances.

This ash has a basic quality, and it is this property that must be taken into consideration in selecting a fire-brick for crucible furnace use. If this is not done, then the ash and the fire-brick easily unite and form a slag. This slag melts and runs down to the bottom of the pit, or forms clinkers which are knocked off from the side of the furnace.

Ordinary silica, or other substances of which silica is the chief constituent, such as the common rocks, is acid in its property. While very infusible, as far as the melting temperature is concerned, contact with a basic material such as alumina, lime, oxide of iron, or soda, at a red heat, produces fusible compounds known as silicates. These silicates are commonly known as slags. If, therefore, a fire-brick high in silica is used in a crucible furnace, although it may be very infusible, the ash of the coal or coke, being of basic quality, forms fusible silicates (slags) with it and fluxes it so that it soon wears away. This fact explains why some fire-brick give very unsatisfactory results in such surfaces.

On the other hand, if a brick of basic quality is used in lining the furnace, the ash, being of similar properties, does not react with it, and there is no fluxing action. This condition, however, is not realized exactly in practice on account of the difficulty of obtaining fire brick of a sufficiently basic quality to prevent any fluxing action of the ash. The well known basic magnesia brick, while chemically sufficiently basic, are too expensive and too fragile to admit of being used for this work.

Some clays are much more basic than others. Those high in alumina, while possessing a basic nature, are also sufficiently infusible for crucible furnace work, and it is this kind of clay that should be used in making fire brick for such a purpose. The two necessary requirements: That of infusibility and basic property, are possessed by it. It is this kind of a fire-brick that has been so successfully used in lining crucible furnaces.

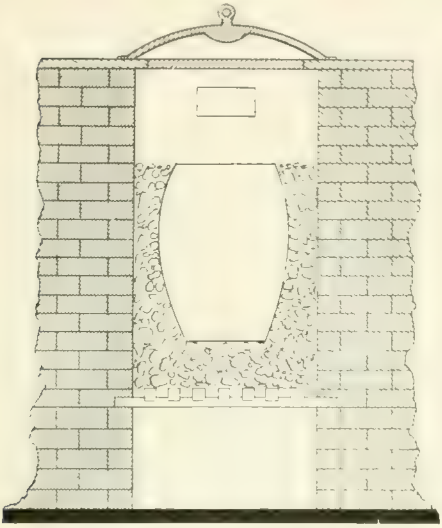


Fig. 2. Normal Condition of Fire-Brick in a Crucible Furnace.

This fire-brick with a basic nature is made by a large number of the fire brick companies, and while it cannot be classed with the highly refractory fire-bricks, it is sufficiently infusible for crucible furnace work, and at the same time possesses the valuable property of resisting the fluxing action of the ash to a marked degree.

The writer at one time believed that a silica fire-brick would be the best for crucible furnace work, on account of its highly refractory nature. It is used in the most severe portions of steel melting furnaces. Such a brick consists almost entirely of silica with just enough clay to act as a binder. It is coarse in structure and quite fragile. A crucible furnace was lined with the brick and the results noted. When the fire was dumped at night, large clinkers adhered to the side. When these were knocked off with the clinker bar, as is customary, not only the clinkers were removed, but large pieces of the bricks as well.

It was soon realized that silica brick was not the material for the place. The ash had fluxed the silica, forming a fusible slag in the form of clinkers, and when knocked off, the brick was so brittle that portions became detached also. The fact that the brick was too brittle to stand the knocking off of the clinkers, brings to mind the fact that in addition to the question of basic character and infusibility, hardness or rather toughness is an essential feature. The object of this property is have a brick that will stand, to the highest possible degree, the shock of knocking off the clinkers. When a soft brick is used, portions of the brick are removed with the clinkers and the body of the fire-brick lining soon wears away.

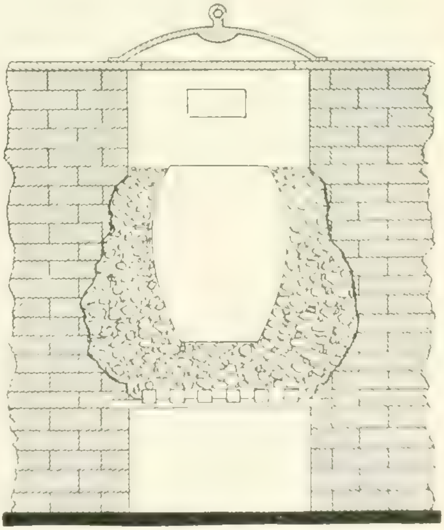


Fig. 3. Fire-Brick After the Furnace has Been in Use for a Long Time. Fuel Consumption is Then Much Increased.

Summing up the necessary requirements of fire brick for use in lining crucible furnaces, it may be said that the following are necessary:

1. Medium infusibility to resist the temperature of the furnace without softening. This property is easily obtained as the heat of the furnace is low compared with the melting point of the fire-brick.

2. Toughness. A close-grained fire-brick is the best for the purpose as the clinkers then adhere only to the surface and do not penetrate as in the case of brick of open grain. This property is quite essential.

3. Basic or "near" basic quality. When this property is possessed by the brick, there is little fluxing action of the ash and the life of the brick is long. A clay high in alumina seems to answer the requirements, and experience has demonstrated that a brick made from such clay gives excellent results.

Taking these three properties collectively, there is produced a fire-brick that answers all the requirements of a crucible furnace lining and without excessive cost. As a usual rule a good fire brick of this kind costs a little more than the ordinary grades, but the results warrant the extra expense. Bricks answering these requirements are used by all of the large brass manufacturers in the East as it has been demonstrated beyond a doubt that they are the best adapted for the purpose.

Some little economy may be practiced in lining a crucible furnace, particularly those which are square. Certain portions of the furnace are not subjected to the fierce heat that takes place immediately around the body near the crucible. The second course of brick or those in the flue do not need to be as good as the ones in immediate contact with the fuel. For this reason it is customary in a number of large brass mills to use a cheaper quality of brick in such portions and the best quality inside the furnace. It gives good results and with considerable economy.

The consumption of spelter for galvanizing in the United States is far in excess of that used for brass making. For the past few years it has averaged 100 per cent greater.

The best flux for use in melting aluminum, alloyed with zinc or copper, is chloride of zinc. A small piece is thrown on the metal when melted and serves to clean the surface. The test of time has proved it to be the most satisfactory flux for the purpose.

Brass Colors in Depositing Brass.

It is impossible to make up a brass solution that will give certain colors by taking the known proportions of copper and zinc salts, on account of the fact that, although the copper and the zinc may be added to the brass solution in the desired proportion, they will not deposit in the same proportion. The presence of free cyanide and ammonia alters the proportion of copper and zinc in the deposit. It is frequently desirable, however, for platers to know the proportion of copper and zinc in the various shades of colors found in brass. The following will indicate it :

Copper	*Zinc*	*Color*
90%	None	Red
95%	5%	Red
90%	10%	Bronze
85%	15%	Light Bronze
80%	20%	Green Brass
75%	25%	Green Brass
70%	30%	Yellow Brass
65%	35%	Yellow Brass
60%	40%	Light Orange
55%	45%	Orange
50%	50%	Orange
45%	55%	14 K Golden
40%	60%	Yellow White
35%	65%	Gray

This table is based upon actual experiments, carefully made to determine the exact color of the mixtures made of pure copper and zinc.

An Improved Electrogalvanizing Solution.

An improvement in electrogalvanizing solutions has been patented by Abraham Van Winkle, president of the Hanson & Van Winkle Co. of Newark, N. J. (U. S. Patent 936,815, Aug. 10, 1909). The use of a solution of fluosilicate of zinc containing small quantities of an aluminum salt and gelatine is the feature of the patent.

It is claimed that the use of the fluosilicate solution is of particular advantage as it remains clear while in use, acts freely on the anodes and allows a very strong solution to be used. It is stated that it may be employed as strong as 32 degrees Beaume and a low voltage may be used. The gelatine serves to produce a smooth deposit.

The "Painting-On" Method of Etching Brass Signs and Similar Articles.

The "painting-on" method of etching metals is not only the oldest known process, but is also suited for a great variety of work, and is quite simple in its working. By its use it is also possible for the individual artistic temperament of the operator to become displayed. Owing to the fact that the "painting-on" method of etching requires hand work in applying the design to the metal surface, it is unsuited for repetition work to be done on a cheap scale, although many designs may be painted on with rapidity, provided the operator is capable of handling the problems in a satisfactory manner. In this connection, however, it may be said that the process is suited for the best class of work and not the cheapest and is generally used for such.

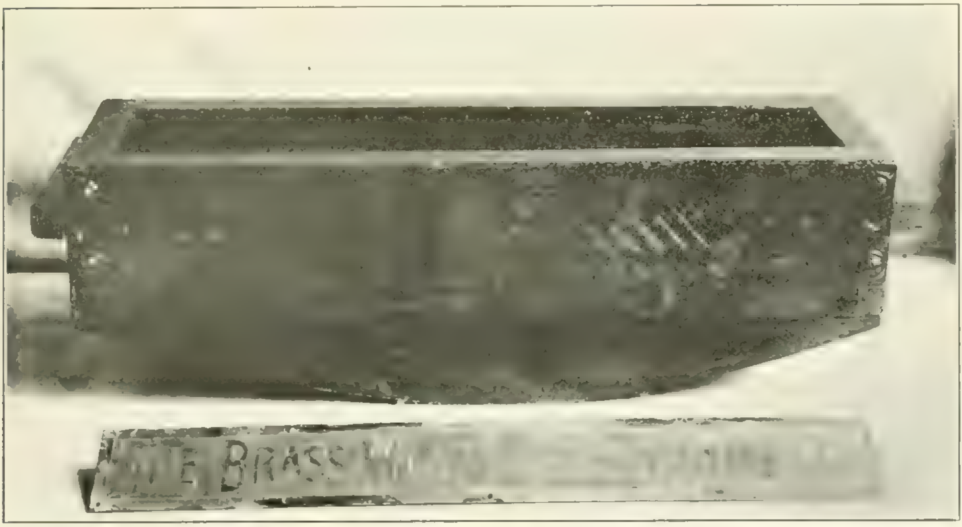


Fig. 1. The Etching Tub with Sign After Etching. Shows Construction for Rocking.

What the "Painting-On" Method Is.

Strictly speaking, the "painting-on" method of etching consists in painting the design on the metal to be etched by means of a suitable varnish called the "resist". The metal is then etched by means of the etching solution and the background etched away, leaving the design in relief. If desired, although the results are usually not as pleasing, the background may be painted on leaving the design bare upon the metal. When thus etched, the design becomes sunk or "intaglio", and the background raised. The letters can be filled with black japan or other material. Many signs look well made in this manner; but as the operator may use either the "relief" or the "intaglio" process at his discretion, and the process of working is the same, only the "relief" method will be described, as it is the one capable of giving the most satisfactory results for general work, such as signs and art-metal work.

The Metal To Be Etched.

Although any metal may be etched by the use of suitable etching solutions, brass or copper is generally employed for the work, on account of the facility with which they may be worked into the desired shapes, and the ease with which they may be obtained. Brass is far more extensively used than copper, although the latter may be employed if desired. The method is identical in either case. The use of silver, steel, britannia-metal, [illegible]

[illegible] silver, or other metals and alloys requires [illegible] suitable etching liquids, and the other operations remain the same. As brass is generally used, it is assumed that it is employed as the example.

In case a sign, such as that herewith illustrated, is to be made, the sheet brass of suitable length and width as well as of the necessary thickness, is polished to remove the roll marks and scratches and leave the surface in a smooth and highly-polished condition. In case a polished surface is not desired, then the cutting down to remove the scratches should be performed; but any desired treatment, such as sand blasting, scouring or dipping may be done. Bear in mind that the surface of the metal before etching is that obtained on the design after the etching is completed. The varnish completely protects it so that when the operation is completed, the simple removing of the varnish reveals the metal in its original condition except on the portions that have been etched. It will be appreciated, therefore, that the surface of the metal to be etched should be uniformly smooth, and either polished or dead. The polished surface is that generally employed and in the signs herewith shown, the metal was buffed to a high surface before the design was painted on. When the sign was completed, therefore, the letters were left in highly polished brass, and with a dead and oxidized background, making the whole very effective.

The Varnish for the "Resist."

As a "resist" there is nothing better than asphalt varnish. It is a well known fact that asphalt withstands the action of acids and other corrosive agents better than any other material that can be used for the purpose. The ordinary asphalt varnish of commerce is perfectly suitable and is quite cheap. There is little likelihood of its being adulterated for the reason that asphalt is so cheap, and there is nothing cheaper that can be used as a substitute.

The brass is first cleaned from grease and dirt by rubbing the surface with a cloth wet with gasoline. A perfectly clear surface is needed in order to prevent the asphalt from flaking off. If the brass is greasy, it is not apt to adhere tenaciously. Care should be taken, too, to keep the parts not painted as clean as possible so that the etching liquid will "bite" sharply at once.

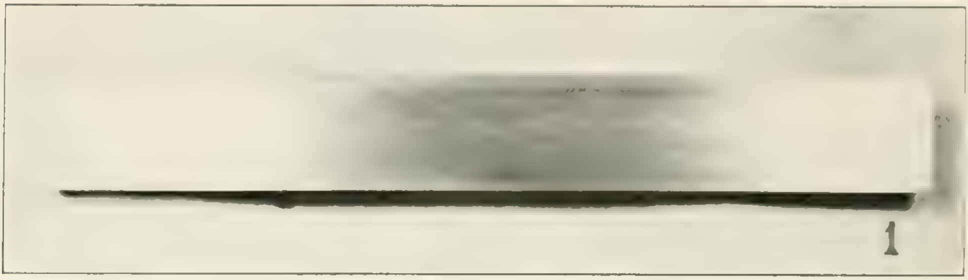


Fig. 2. The Surfaced Brass Plate Ready for Painting on the Name.

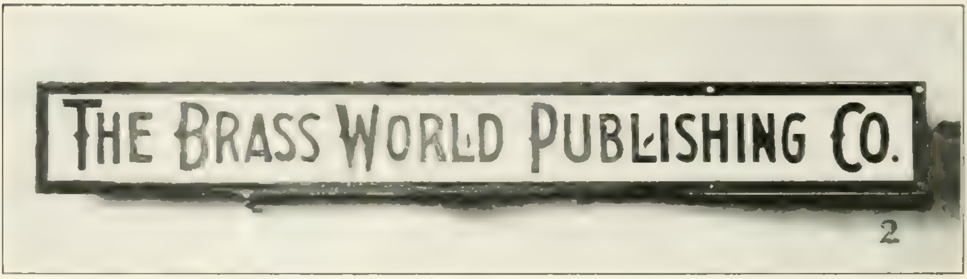


Fig. 3. The Brass Plate After the Name Has Been Painted on with Asphalt.

The asphalt varnish is thinned with turpentine so that it works freely, but it should not be too thin or the design cannot be painted sharply. With new asphalt paint, very little turpentine, if any, is needed. By the use of turpentine for thinning the asphalt, a tough varnish is produced that does not easily flake. It does not dry rapidly, however, and usually takes several hours to become sufficiently hard to handle. If a rapid drying asphalt is desired, benzole should be used for the thinner. Turpentine gives the best results, however, and should be used whenever possible.

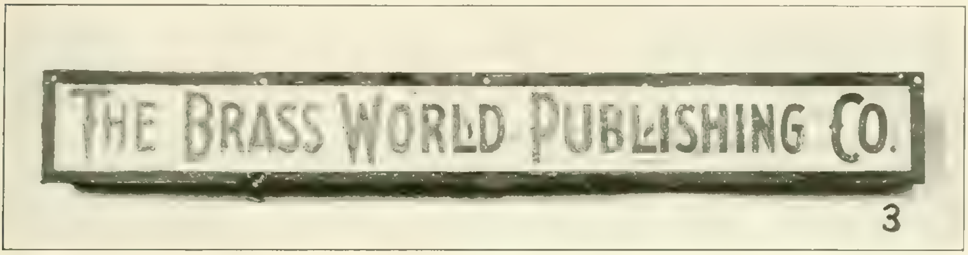


Fig. 4. The Brass Sign after Etching with Muriatic Acid and Chlorate of Potash.

The desired design is painted on the surface of the strip of brass shown in Fig. 2 so that when completed it has the appearance shown in Fig. 3. The asphalt varnish need not be thick as even a thin coating is sufficiently impervious to prevent the etching solution from attacking the metal underneath it. It is well, however, to have it thick enough to give a good, black letter, particularly if a deep etch is to be made.

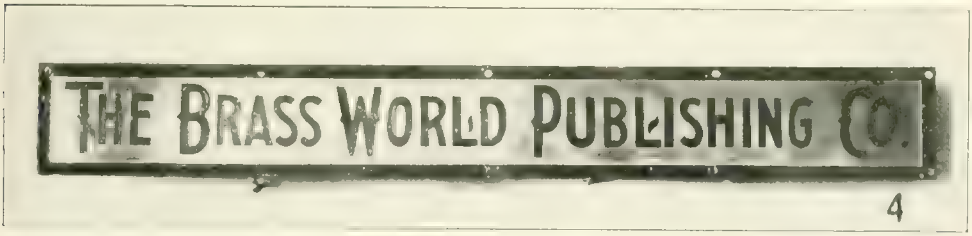


Fig. 5. Shows the Sign after the Background has been Copper Plated in an Acid Copper Solution.

The Etching Tank.

If the etching is to be done by means of regular solutions employed for the work, then an etching tank is necessary. This tank is shown in Fig. 1 and is easily made from wood. Good, hard wood, such as maple is satisfactory or any other similar wood will do. The joints are carefully made, and before putting together are coated over with thick asphalt paint and then screwed tight. The object is to obtain a tank that will not leak. It is possible in the trade to obtain glass or earthenware tanks for this work, but they are no better than wood, are costly and easily broken. For large work, wood will have to be used, too, as it is impossible to obtain the glass or earthenware tanks of sufficient size.

The bottom is preferably provided with rockers as it is necessary, in performing the etching, to rock the tank from time to time, and in some instances constantly. The bottom rockers allow it to be done conveniently. It is possible, in cases of necessity, to get along without them.

The inside of the tank should be heavily coated with a number of coats of thick asphalt paint, allowing each one to dry before the other has been applied. The paint will protect the wood from the corrosive action of the etching liquid. No metal parts, such as screws, nails or bolts should be exposed.

The Etching Solution.

While there are a number of solutions that can be employed for etching brass and copper, the best is a mixture of dilute muriatic acid (hydrochloric acid) and chlorate of potassium. It gives a nice, matt surface after etching. A strong solution of perchloride of iron may also be employed, but it works quite slowly and is better suited for light etching. Nitric acid, although used for steel etching, is unsatisfactory for the brass or copper as it acts too violently and is apt to lift off the "resist". It is also possible to etch by "backing off" in a solution of sulphuric acid in water by means of the electric current. The metal to be etched is made the anode.

The muriatic acid and chlorate of potassium is the solution generally employed for etching brass and the work herewith illustrated was etched by it. It is open to one serious objection, and that is the fact that it gives off pungent chlorine fumes. If the etching is done regularly so that a special exhaust hood or fan can be used for removing the fumes, then it does not give much trouble; but in ordinary etching it is apt to result in much annoyance unless care is taken. If the etching is done out of doors, there is little danger, or even before an open window. The tank is kept covered while the etching is going on. The use of the perchloride of iron for the electrolytic etching is not open to the objection of the fumes.

To begin the etching it is well to flow over the brass plate to be etched, a solution made of the following:

Water	2 parts
Nitric Acid	1 part

This need not be used in the tank but can be flowed over the surface of the brass in a sink. This dilute acid should be used *cold*. As soon as it begins to "bite" on the brass surface not covered with the asphalt, immediately wash off under the faucet.

The object of using this preliminary wash is to clean the brass and prepare it for the regular etching liquid. The asphalt is not affected by it. Do not touch the surface with the hands at this stage or the etching liquid will not act evenly. Any spots or stains on the brass should be removed before applying the nitric acid. The idea is to obtain a clean surface for the action of the etching liquid.

The etching solution is made up as follows:

Solution A.

Water	1 quart
Muriatic Acid	2 quarts

Solution B.

Water	1 quart
Potassium Chlorate	3 oz.

These solutions should be made up sometime before use as in the case of the "Solution A" heat is generated when the water and acid are mixed. If used warm or hot, the asphalt "resist" will soften and give trouble. The two solutions "A" and "B" are not mixed until wanted as gas is given off when it is done.

The article to be etched (the brass plate shown in Fig. 3) is placed in the bottom of the etching tank and a sufficient quantity of "Solution A" flowed over to cover it. A small quantity of "Solution B" is then added and the tank rocked to mix the two. After a short time action will commence and it may be noticed by the appearance of the brass. The polish soon disappears.

After a short time more of the solutions "A" and "B" should be added and a sufficient quantity of liquid must be kept in the tank to avoid heating, as the action on the metal generates heat which, if allowed to become too great, will attack the asphalt. By the use of plenty of solution this may be avoided.

After the lapse of half an hour the solution begins to turn green from the dissolved copper. This indicates that the action is going on satisfactorily. The tank is rocked from time to time to keep the solution in circulation and expose fresh solution to action on the metal.

The length of time consumed in etching depends upon the depth desired. For many purposes, a light etch is sufficient and this takes from 15 to 30 minutes. Deeper etching takes longer. One of good depth takes several hours. For many classes of work about 1 hour gives depth enough. The signs herewith shown were etched for that length of time. The operator may easily ascertain whether the required depth has been produced by inspecting the brass after the operation has been continued for some time.

During the etching operation the "resists" should be carefully watched and if there are any portions which are bare, the plate can be removed, washed and dried and the ex posed portions touched up with asphalt paint.

When the etching has been finished the plate is washed in cold water and is ready for the next operation, that of copper plating the background. The etched sign has the appearance shown in Fig. 4.

Coppering the Background.

While not imperative that the background should be oxidized, the best effects are produced if it is treated in this manner. In case it is not desired, then the etching is completed and the brass need only be rinsed and dried. In case the background is actually to be oxidized so as to produce contrast between it and the portions in relief, it is first necessary to give the etched article a light deposit of copper in an "acid copper solution".

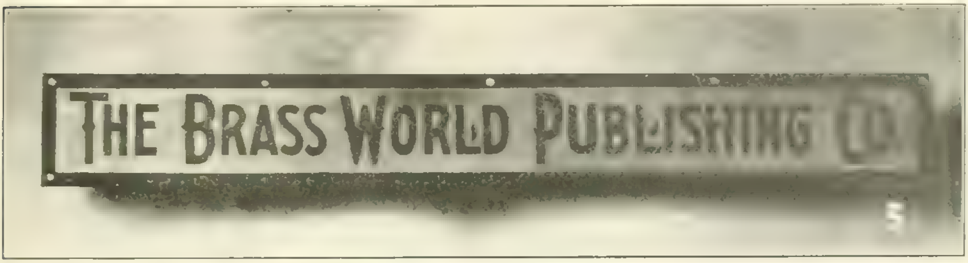


Fig. 6. The Sign After Oxidizing in Liver of Sulphur Solution. The Asphalt is not Attacked and the the Background only is Oxidized.

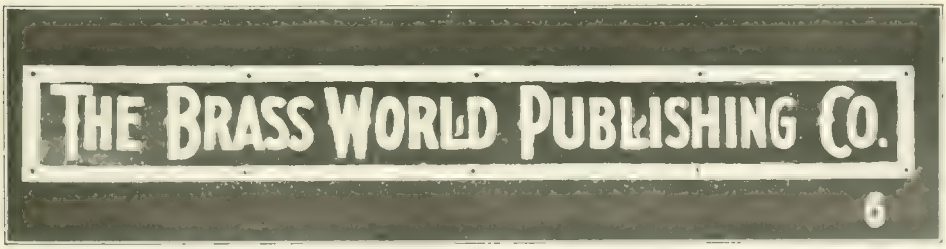


Fig. 7. The Finished Sign After the Asphalt has been Removed with Turpentine. The Letters are Polished Brass and the Background Dead Black.

It should be borne in mind that the "resist" during all this time is left on and is only removed at the very end after everything else has been done.

The acid copper solution used for this purpose is made up as follows:

Water	1 gallon
Copper Sulphate	[illegible]
Sulphuric Acid	[illegible]

This solution is used cold and with the electric current. A copper anode is employed and the etched article is made the cathode.

When the etched brass is first removed from the etching solution and rinsed, it is free from tarnish or stain; but upon standing for some time imperfections of these kinds appear. When the surface of the brass is thus tarnished, a solution composed of equal parts of muriatic acid and water should be flowed over the surface which will remove the tarnish and stain and leave it clean. Then rinse and *without drying* immerse in the copper plating solution and deposit the copper on it. A weak current of from 1 to 2 volts should be used.

The deposition of the copper should be carried on for about half an hour in order to obtain a thickness sufficient for oxidizing.

The deposition should not be carried on too long or the copper deposit will be so heavy that it will fill up the background. After the copper plating, the [illegible] is now ready for oxidizing.

Oxidizing the [illegible]

The oxidizing solution used [illegible] liver of sulphur and is made up as follows:

Water	1 gallon.
Liver of Sulphur	2 oz.

This oxidizing solution is used cold and the sign is immersed in it after coming from the copper plating solution and after rinsing. It should not be allowed to dry, unless absolutely necessary as the copper is apt to be stained when dried. The oxidizing is then apt to take place unevenly.

The sign is immersed in the cold oxidizing solution and allowed to remain until the surface is uniformly black. Do not allow it to go beyond this point or the black sulphide of copper formed is apt to flake off. When the desired color arrives, remove the sign and rinse. When dry, the background will be found a uniformly dead black. The "resist" is not affected by the liver of sulphur as it is used cold and the immersion is of short duration. The sign after oxidizing has the appearance shown in Fig. 6. If a good black has been obtained the sign is ready for removing the asphalt.

Removing the Asphalt.

The asphalt on the sign is now removed with turpentine. The right method of removing it is to dip a soft brush or soft rag in turpentine and pass lightly over the surface. Friction should be avoided as it is apt to injure the background. Allow the turpentine to remain for a few minutes when it will soften the asphalt so that it can be easily wiped off.

The letters will be found bright and clean and the background black and dead, forming a very attractive article. The excess of turpentine should be wiped off as completely as possible and then the surface wiped with a clean, soft rag and benzine or gasoline. In this manner it is cleaned for lacquering.

The surface should be lacquered as soon as possible with a good quality of lacquer. The sign is then completed and has the appearance shown in Fig. 7.

All through the various operations the asphalt remains untouched until the final process of removing it, and thus protects the polished surface of the brass from injury. While other varnishes and "resists" can be used with some success, for deep and rapid etching there is nothing like asphalt as it withstands the corrosive action of the various solutions better than anything else.

Summary of the Operations.

The various steps in the process of making the brass signs previously described may be summarized as follows:

1. Polishing the surface of the brass plate.
2. Painting the design on the surface with asphalt varnish.
3. Etching with the etching solution.
4. Copper plating the background.
5. Oxidizing the background with liver of sulphur.
6. Removing the asphalt "resist" with turpentine.
7. Lacquering the sign.

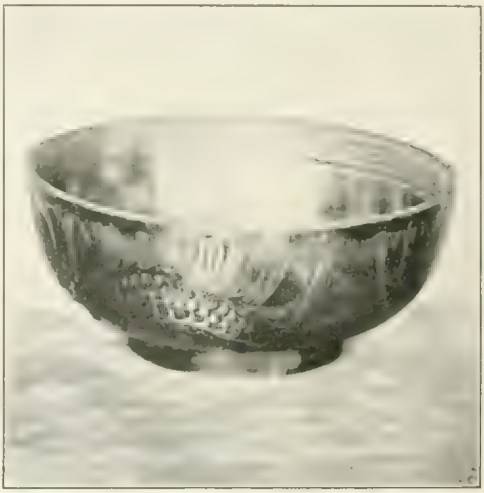


Fig. 8. Japanese Brass Bowl Etched by the "Painting-On" Method.

The making of articles by this method is simple and many excellent results may be produced if one has the capability of making the necessary designs. In Fig. 8 is shown a brass bowl with an etched design on the surface. The bowl was made in Japan and the design on the surface was etched in the manner previously described. Articles of this kind are sold extensively and are familiar to the majority of people.

This process is applicable to many classes of wares upon which artistic results are desired. If metals other than brass or copper are to be etched, then a different etching solution may be necessary. For steel and iron, nitric acid is usually employed in the proportion of 4 parts of water and 1 part of nitric acid. Frequently a stronger acid may be used, and in this case 2 parts of water and 1 part of acid are taken. The etching had better be commenced with the weak acid and then try the stronger acid to ascertain if the "resist" will stand it.

The use of a solution of perchloride of iron is not accompanied by any fumes like that of the muriatic acid and chlorate of potash, and if desired it can be used. It works slowly, however, and does not give as clean an etch as the muriatic acid mixture. The perchloride of iron is dissolved in water until saturated. In other words as strong a solution as it is possible to make is used. As this solution does not give a clean etch, after the action has gone on for a short time, the plate is removed and immersed in the following solution:

Water	1 gallon
Sulphuric Acid	1 oz.
Chromic Acid	1 oz.

This solution serves to clear away the deposit which forms from the chloride of iron and exposes the clean brass. It is then returned to the perchloride of iron solution and the etching finished. This method, however, is so slow that it is not generally used for this class of work, but is more suitable for light etching such as that on half tone plates used for printing.

An Easily Made Metal-Polish.

An excellent polish for cleaning and polishing brass, copper and German silver objects, such as automobile lamps and trimmings, signs, faucets, engine trimmings, show-case trimmings, and many similar kinds of goods, may be easily made in the following manner:

Three ingredients only are necessary. Gasoline, oil, and stick or bar tripoli. The gasoline is so well known that no further comment is necessary. The oil may be lard oil or lubricating oil of any kind; in fact, any oil will answer although mineral oil such as that used for lubricating machinery is the cheapest and gives perfectly satisfactory results. It is used to soften the tripoli and also to prevent it from drying on the surface of the metal to be polished when the gasoline evaporates. The tripoli should be of the grade known as "quick cutting tripoli." By this is meant that it contains some [illegible] ground silex (quartz) which gives it the property of scouring. If tripoli only is used, it is not sufficiently powerful in cutting quality to scour off the surface of a badly corroded piece of copper or brass. By the use of both the silex and tripoli it is possible to obtain a scouring and polishing material in one. To be sure, a high polish cannot be obtained with it, but it is sufficiently good for the majority of purposes. If a higher "color" is desired on the metal, then another polish containing rouge will have to be employed after the metal has been treated with the first. This, however, is rarely necessary as will soon be found by trying. The proportions used are as follows:—

Gasoline	1 quart
Tripoli (Bar)	½ lb.
Oil	½ pint

The tripoli is first placed in a pan with the oil only and heated until the whole is melted. Stir well to mix. *Then remove from the fire* and allow to cool until just barely soft. The gasoline is next added and the whole mixed by stirring. If too warm when the gasoline is added, it will boil. The safest method is to let it cool completely before adding the gasoline. Under no circumstances add the gasoline in the neighborhood of a flame or fire. The liquid is then ready for use. It should be shaken each time it is used.

The bar tripoli can be cheaply purchased, of course, from dealers in platers' supplies; but remember that the best results are always obtained by using the grade known as "quick-cutting." The polish thus produced according to the preceding formula is excellent and will remove the dirt, grease and corroded surface from brass or copper with great rapidity and produce a satisfactory polish. It is sold on the market under various trade names and at a comparatively high price. There are many persons who have facilities for making it cheaply for their own use or for sale, if desired, as it is not a patented composition. For automobile work it cannot be excelled.

Carnauba-wax is the hardest known wax and is obtained from a species of palm tree found in Brazil. It forms a coating on the leaves and is procured by shaking and pounding.

How Bells Were Cast in Olden Times.

History records the casting of bells centuries ago, tells of their wonderful qualities and size and particularly their religious connection, but fails to describe, except in a general way, the method of casting. The ordinary reader is interested more in the bell itself than in the method of casting. The founder desires to know how the operation was carried out.

Take, for example, the Great Bell of Moscow, made in Russia in 1734 and not only the largest bell ever cast, but the largest casting of any kind ever made. To make a casting of this size at the present time would startle the world. The Chinese Bell weighing some 120,000 lbs., is another example of ancient casting.

As far as known, these bells were cast from metal melted on the premises where the mold was made. An air furnace capable of melting the desired quantity of metal (perhaps several furnaces were used) was erected in close proximity to the mold and so arranged that a trough was run from the tap hole to the mold. When ready, the copper and tin mixture used for the metal was tapped out of the furnace and allowed to run into the bell mold. It is the natural method of casting a large bell of such enormous weight, and one which is the logical one as it would be used at the present time were a similar casting to be made. One could scarcely find a better method even with all the modern methods of melting and casting now known.

A New Aluminum Solder.

A new composition for soldering aluminum was recently patented by [illegible] of [illegible], Ohio. (U. S. Patent [illegible], Aug. 17, 1900). The following ingredients are claimed:

Zinc	8 oz.
[illegible]	[illegible]
[illegible]	30 grains
[illegible]	[illegible] grains

The metals are melted together and then the [illegible] acid is added. The solder is used in the usual manner, but a blowpipe is preferred as the source of heat.

Correspondence.

The Invention of Phosphor-Bronze.

Editor:

I have only just read Mr. Lagerwall's letter in the July number of The Brass World on the above subject, and although I have not seen the article to which he refers I should like to make it perfectly clear that my father, the late Mr. Alexander Dick, never in any way claimed to be the inventor of "Phosphor-Bronze", but as Mr. Lagerwall has rightly said the alloy was Dr. Kunzel's invention.

My father, who was Dr. Kunzel's friend, introduced it into England and was the original founder of the Phosphor Bronze Company here. The late Mr. C. Adolph Dick was my father's brother.

[illegible]

London, England, August 12th, 190

Rapid Increase in the Demand for Brass Tubing.

The demand for seamless brass tubing is rapidly increasing and it now forms one of the most profitable products of the brass rolling mill that is fortunate enough to have a tube plant as one of its departments. No product in the brass line holds out more promise.

The reason for its rapid increase is principally accounted for by the extensive use of tubing in the plumbing industries. Modern plumbing demands exposed work and brass is the only material suitable for it. The automobile trade has also contributed quite largely towards the increase in consumption, and bids fair to contribute still more. The decline in the building of sailing vessels, and the increase in our merchant marine consisting of steam propelled ships, has created an increasing demand for brass condenser tubing. This demand, however, is somewhat spasmodic, and depends, to a certain extent, upon the Government appropriation for naval equipment.

The rapid increase in the demand for brass bedsteads has not stimulated the seamless brass tubing industry as much as would be imagined, as steel tubing, brass covered, is used for most of the work and is very satisfactory for this purpose.

A Simple Method of Recovering Gold from Cyanide and Yellow Prussiate Plating Solutions.

The recovery of gold from cyanide plating solutions has always been an unsatisfactory process. The method usually practiced by gold and silver refiners is to evaporate the solution to dryness and then melt the residue, but it is an expensive and unsatisfactory operation for the reason that gold plating solutions contain very little gold, and the cost of recovering it in such a manner is frequently greater than the value of the gold obtained. The other method, frequently followed, of attempting to precipitate the gold by means of an acid is also very unsatisfactory, both for the reason that it fails to recover little if any of the gold and also gives off the dangerous hydrocyanic acid fumes. There is still another method often tried, and that is to deposit the gold on a strip of steel by means of the electric current. This method also fails to a certain extent as it is very slow and does not remove all of the gold. The large excess of cyanide in the solution prevents the deposition of the gold completely.

Principle of the Method.

The principle of the method about to be described lies in the fact that if metallic zinc is immersed in a cyanide gold solution, the gold is precipitated on the surface and adheres firmly. After a time, the gold is completely removed from the solution and the zinc may then be dissolved in sulphuric or muriatic acid leaving the gold undissolved.

This method, of course, is not new as it has been used in gold mining for a long time and is known as the "cyanide process." The principle is the same in mining, as the gold ore, from which the gold is to be extracted, is treated with a solution of potassium cyanide in water which dissolves the gold completely. The solution is then treated with zinc, the gold precipitates upon it from which it is readily obtained. It is believed, however, that this method, although long and extensively used in recovering gold from lean ores, has not before been applied to the reclaiming of gold from plating solutions.

Treating the Gold Plating Solution.

The gold plating solution from which the gold is to be reclaimed is placed in a stone crock or any other receptacle that may be desired. Large solutions may be treated in a tank. The metallic zinc used gives the best results if in the form of fine turnings, resembling curled hair, and in the gold mining industry, a special form of lathe is used for cutting slab zinc into such a shape. In case such turnings cannot be obtained, then sheet zinc clippings, granulated zinc, borings or any

The Zinc Shavings and Gold Solution.

other form of zinc [illegible] may be employed. The object is to expose the greatest amount of surface to the liquid, and the turnings are excellent, both for the reason that they expose the necessary surface and hold together well when the exhausted solution is poured off after the gold has been removed. In using the process [illegible] well.

The precipitation of the gold in the gold plating solution [illegible] at room temperature, and the precipitation [illegible] the zinc to aid the precipitation. From 1 to 2 oz. of zinc to 1 gallon of the gold plating solution will give rapid results. To extract the gold, therefore, take the following:

Gold Plating Solution	1 gallon
Zinc Turnings	1 oz.

The turnings or other convenient form of zinc are placed in the bottom of the solution and allowed to remain for some time. Usually a few hours are all that are required for the precipitation, during which time the solution should occasionally be stirred in order to expose it to the zinc as thoroughly as possible. A good plan is to place the zinc in the gold solution during the day, stir frequently and then allow it to remain over night. In the morning the operation is completed.

When placed in the solution, the zinc first turns gold colored and then black, but the gold does not become spongy or non-adherent. It adheres tenaciously to the zinc so there is no danger of its falling off.

It is unwise to allow the zinc to remain too long in the solution as nothing is to be gained and a white zinc salt is then formed which interferes somewhat with the decanting of the solution. This white zinc compound, however, usually will not form under several days.

Removing the Zinc

After the gold solution has remained with the zinc in it for the necessary length of time, the solution is poured off from the zinc as completely as possible. The zinc may now be taken out and placed in a smaller vessel such as an evaporating dish or glass jar (as shown in the illustration) in order to allow a more convenient treatment.

The zinc is washed thoroughly by pouring clean water over it and then pouring off completely. This is done five or six times. It is unnecessary to filter the solution as all of the gold adheres to the zinc.

Treating the Zinc with Acid

The zinc now completely washed is treated with sulphuric acid made up as follows:

Water	9 parts
Sulphuric Acid	1 part

The water and the acid are mixed and allowed to cool. It is then added directly to the zinc in small portions at a time in order to prevent too rapid an action. The zinc gradually dissolves leaving the gold.

When all action of the acid on the zinc ceases a large number of black flakes will be found floating around in the solution. These are the gold. Owing to the fact that they do not settle readily it is necessary to filter them and it is easily accomplished by the use of a glass funnel and filter paper. When all the solution has drained off from the gold, the funnel is filled up with clean water and again allowed to drain off. This is repeated five or six times in order to get rid of all the sulphate of zinc in the filter paper.

When the gold has thus been washed, it is allowed to remain on the filter paper and the whole dried. The flakes then may be easily brushed off with a small, stiff brush.

Final Treatment of the Gold.

The gold thus obtained, while sufficiently pure for many purposes, contains more or less lead and frequently a little silver. The lead is obtained from the zinc used. It is impossible to obtain zinc free from it. If the gold plating solution contains silver, this, too, will come down with the gold. The gold, therefore, needs purification before it can be used. The method is as follows:

Place the gold flakes (after they have been detached from the paper) in a small evaporating dish or casserole and pour over them a mixture of two parts of water and one part of nitric acid. The nitric acid must be chemically pure otherwise it may contain some chlorine that will form aqua-regia and dissolve the gold. The whole is then heated for some time until all action ceases and the gold is allowed to settle. The clear liquid is poured off, another portion is poured on, and the heating again allowed to take place. Actual boiling is preferable as the gold is then more thoroughly purified.

The gold will turn a clear yellow color and resemble pure gold. Before it is usually black. When the second heating has been completed, the clear liquid is poured off completely, clear water added and then poured away. The addition of water should be repeated five or six times when the gold will have been washed free from acid and other foreign matter. The gold is now pure. If heated to redness in a small crucible, it becomes quite dense and of a brighter color. If desired, it may be melted in a clay crucible under borax and a small button obtained. This, however, is unnecessary as it only serves to unite the gold into one mass.

Testing the Process.

The feasibility of the process was tested by making the following experiment. A gold solution was made up in the following manner and serves to represent a gold plating bath generally used:

Water	1 gallon
Potassium Cyanide	3 oz.
Gold	1 dwt.

To this was added 1 oz. of fine zinc turnings and the whole frequently stirred and allowed to remain over night. In the morning the solution was poured off, the zinc washed, treated with acid in the manner previously described and the gold melted down into a bead and weighed. The gold used for making up the solution was accurately weighed so that a close check could be obtained. The following are the results:

Gold taken	1.000 dwt.
Gold obtained	.978 dwt.
	.022

Loss — 2.2 per cent.

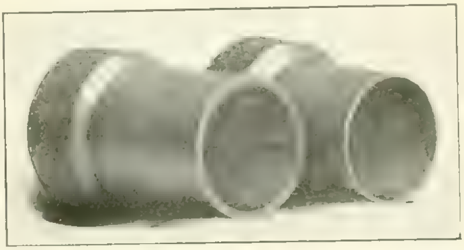
It will be appreciated, therefore that the loss of 2.2 per cent of gold is quite small for such an operation and probably much of it was lost during the washing and other mechanical operations. It serves to indicate, however, how accurate the process is and how easily it may be applied to the reclaiming of gold from plating solutions. The successive steps in the process may be enumerated as follows:

1. Treating the gold solution with zinc turnings.
2. Washing the zinc turnings from the exhausted solution.
3. Treating the zinc turnings with dilute sulphuric acid.
4. Washing the flake gold left.
5. Treating the flake gold with dilute nitric acid to remove lead and silver.

The best results are always obtained in nickel plating by the use of part new and part old anodes. If a nickel solution is supplied with all new anodes it is not fed sufficiently until their surfaces have been dissolved away. By the use of part new and part old anodes, the neutrality of the solution is not disturbed.

"Homogen," a Flux of New Principle for all Copper Alloys.

A new flux called "Homogen" has recently made its appearance on the market, and is quite unique in its composition for the reason that it is wholly unlike anything else which has yet been manufactured in this line. This flux is composed of brass filings, chemically treated, and is the only one that is actually placed in the crucible with the metal. It melts with the metal, the chemicals leave the brass filings at the same temperature at which copper melts, and working through the molten mass, exert a chemical action on the impurities. They are then eliminated, leaving the initial weight of the brass filings added to the metal. The mixture of metals in the crucible is not altered appreciably. In addition to purifying the metals from oxygen and other foreign matter, the "Homogen" eliminates the iron to such an extent that it cannot be discovered in machining.



Bushings Cast of Scrap, Red Brass, Showing Effect of "Homogen" in Preventing Leakage Under Pressure.

In order to become convinced that this flux will greatly improve the grain of bronze or brass, let two test bars and some cored bushing be cast with and without it. Break the flat test bars in a vise and test the bushings by hydraulic pressure. It will be noticed that the grain of the test bars is greatly improved and is much sounder and closer. The metal treated with "Homogen" will stand twice the amount of pressure that can be put upon the untreated bushings.

To demonstrate the effect of this flux in eliminating iron from brass or bronze, take 20 lbs. of new metal that is free from iron, and then add to it 1 lb. or 5 per cent of iron or steel chips. Add 1 per cent, about 4 oz., of "Homogen" and melt, pour into a round bar and then try to find the iron in it with a [illegible] on a lathe. The skin of the casting will be black, showing that the iron has been chemically alloyed with the metal; but only a chemical analysis will show it. The metal is not affected in any way, and with the usual quantities of iron, the color is not altered.

The following comparative tests of various metal mixtures were made by the Allyne Brass Foundry Co., of Cleveland, Ohio, both with and without "Homogen" and indicate the effect of this flux on the quality of the metal:

Manganese Bronze

	Fluxed	Not Fluxed
Ten. Strength Sq. In.	70,300 lbs.	64,800 lbs.
Elongation in 2 in. ...	22.5 % ..	12.5 %
Reduction of Area ...	21 % ..	17 %

Government Bronze

	Fluxed	Not Fluxed
Ten. Strength Sq. In.	41,200 lbs.	37,800 lbs.
Elongation in 2 in. ...	15.5 % ..	10 %
Reduction in Area ...	16.8 % ..	11 %

Red Brass (New Metal)

	Fluxed	Not Fluxed
Ten. Strength Sq. In.	34,950 lbs.	31,650 lbs.
Elongation in 2 in. ...	43.5 % ..	36 %
Reduction in Area ...	35 % ..	31 %

Red Brass (Scrap)

	Fluxed	Not Fluxed
Ten. Strength Sq. In.	26,050 lbs.	24,400 lbs.
Elongation in 2 in. ...	11 % ..	7.5 %
Reduction in Area ...	6 % ..	4 %

Yellow Brass (New Metal)

	Fluxed	Not Fluxed
Ten. Strength Sq. In.	32,900 lbs.	30,100 lbs.
Elongation in 2 in. ...	46.5 % ..	35.5 %
Reduction in Area ...	40 % ..	31 %

Yellow Brass (Scrap)

	Fluxed	Not Fluxed
Ten. Strength Sq. In.	25,750 lbs.	22,300 lbs.
Elongation in 2 in. ...	21.5 % ..	17.5 %
Reduction in Area ...	21 % ..	13

As an indication of the effect of the flux in producing sound castings for hydraulic work, the bushings herewith illustrated may be taken as an example. They were both cast of scrap red brass. One hundred pounds were first melted and poured into ingots. This gave as even a mixture as it is possible to obtain, the same metal in each ingot. The ingots were then divided into two lots of 50 lbs. each, of which was remelted. In one lot, "Homogen," was used, while the other was melted in the usual manner. The conditions of temperature, melting, etc., were the same in each case.

The castings were then machined for a hydrostatic test, the inside skin being removed. They both stood the test of 1000 lbs. pressure. They were next put in a lathe and a thirty-second of an inch taken off from the outside. They were then put under pressure until sweating or leakage took place. The illustration shows the exact thickness of the walls when the test was made. The casting without "Homogen" leaked with the walls 1/8 in. in thickness, while the one treated with it did not leak until the walls were reduced to a thickness of 1/16 in. Cold water test was used and the pressure was 1000 lbs. in each case. Yellow brass, both scrap and new metal, was tried and the results were in the same proportion to those of the red metal.

"Homogen" is being placed on the market by the Allyne Brass Foundry Co. of Cleveland, Ohio, who have found it so satisfactory for their own work that they decided to sell it to the brass trade.

A New Method of Galvanizing.

A new method of galvanizing has recently been patented by Geo. L. Patterson, Thomas L. Mornes, and Carl H. Zieme of New Castle, Pa. (U. S. Patent 928,398, July 20, 1909.) The iron or steel to be galvanized is coated with a paste composed of the following:

Zinc Flue Dust	88 parts
Lampblack	2 parts
Clay	10 parts

The ingredients are mixed with water and applied to the cleaned iron or steel surface. The whole is now placed in a furnace and heated to a temperature, the inventors say, of from 600 to 1000 degrees F. This heating is continued from half an hour to four hours when the article is removed from the furnace and allowed to cool in a place which is free from oxidizing influences. The paste is now dried but is easily removed, when it will be found that the surface of the iron or steel is coated with zinc.

The inventors say that the coating thus produced is superior to that obtained by "Sherardizing" and that much less zinc dust is employed. The operators, too, are not subject to the influences of the zinc dust.

The New "Monarch" Core-Oven.

A new and useful form of core-oven has recently been placed on the market by the Monarch Engineering & Mfg. Co. of Baltimore, Md. It is designed for baking both large and small cores and is made with a number of compartments so that cores of different kinds may be easily obtained without disturbing the others.

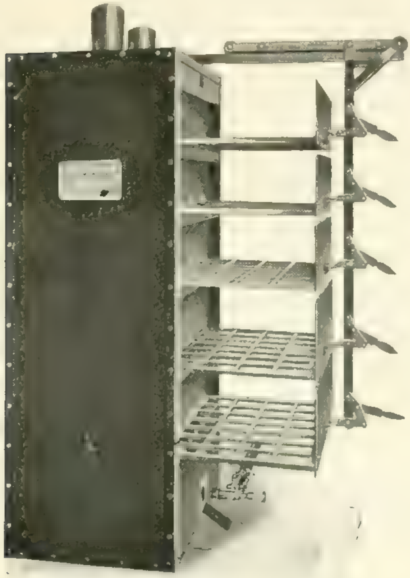


Fig. 1. New "Monarch" Core-Oven with All Shelves Removed.

The furnace is designed for use with oil or gas and in this feature is a novelty for the reason that core-ovens have always been used with coal or coke for the fuel. Foundries equipped with oil for melting, therefore, will find the oven a very useful accessory.

The shelves are portable and of full size and draw to the front with the stock of cores, singly, in sections or in pairs as may be desired. The device used for drawing out the shelves is unique and may be understood by referring to Figs. 1 and 2. A traveller is attached to the top of the oven over which an arm runs on rollers. On the arm are fastened a number of grips which engage the shelves when desired and not only serve to pull them out, but to support them as well.

The oven is supplied with a front burner and is built portable. The usual size is 2 x 3 x 6 feet although any desired size will be built to order. The fuel consumption in the oven is an extremely important feature and is quite low.

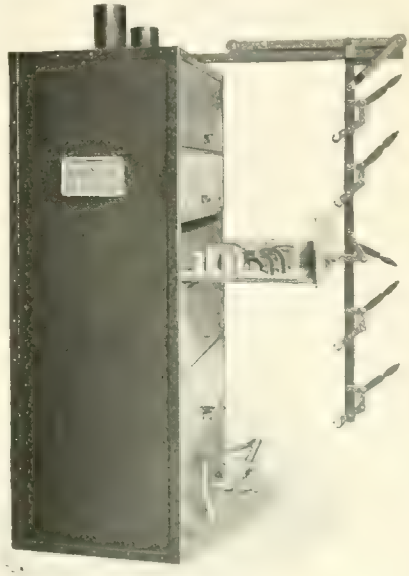


Fig. 2. New "Monarch" Core-Oven with One Shelf Drawn Out.

Although this oven was exhibited at the Foundrymens' Convention at Cincinnati, Ohio in May and created much interest, it has only recently been placed on the market.

Water-glass is made by fusing powdered quartz with sodium-carbonate (sal-soda) or caustic-soda. The mass obtained is soluble in water and when cool forms a jelly like substance resembling glass. Water-glass is chemically known as silicate of soda.

The addition of a small amount of tin, nickel, iron or manganese to Muntz-metal increases its resistance to sea water. It has been found by experiment that the copper and zinc alloys, such as Muntz metal, corrode more rapidly in sea water when they contain only copper and zinc than when a small amount of the other metals is contained in them. Nickel, iron or manganese are preferable to tin for increasing the resistance.

Cost of Making Brass Goods in the Boston Municipal Shop.

The Boston Water Department maintains a machine shop in which, along with gate-valves and hydrants, are manufactured brass goods which in the year 1907 cost the city nearly $9,000. This department has since been investigated by Metcalf & Eddy, the consulting engineers of Boston, Mass., whose report has just been published. From this it appears that the costs and commercial prices were as follows:

Under the head of brass goods are classed corporation and sidewalk stop-cocks, and various couplings, nuts, soldering-nipples, etc., used mostly in establishing services.

In the case of these goods, as with the valves and hydrants, the rough castings are made for the department by contract and the articles are finished in the department's machine shop. In comparison with the valves and hydrants the work is small, the principal items being 5/8 inch corporation-cocks and sidewalk cocks.

The articles do not differ materially from standard commercial patterns. Some improvement in quality is perhaps obtained by carefully specifying and testing the quality of the metal, and by testing the finished goods before they are put into service. Certainly, substantially as good articles could be bought from commercial houses under specifications stipulating the quality of the metal and the tests which the finished work must undergo, and at considerably less cost to the city.

The actual unit costs of the more important brass articles in 1907, together with the prices at which similar commercial articles could have been bought in the open market are presented herewith. It is quite probable that still better prices could have been obtained under contract, in the quantities required by the department.

In addition to the loss involved in the excessive cost of manufacture, it is understood that these brass goods have been a source of loss to the city from the fact that the composition metal of which they are composed is valuable and considerable quantities of it have been lost or stolen from the shops and storerooms. The parts of the goods are small and easily slipped into a man's pocket. Losses due to this cause do not appear in the statements of cost previously given.

For these reasons, of which excessive cost is by far the more important, the engineers believe it wise that the policy of manufacturing brass goods in the city shops be entirely abandoned, and that they be purchased by contract under specifications.

Cost of Certain Brass Goods to the City of Boston in 1907, with Prices of Similar Commercial Articles.

Description of Articles	Number Manufactured	True Cost Computed by Metcalf & Eddy	Price of Commercial Articles in 1907
Corporation Cocks:			
⅝-inch	981	$0.98	$0.67½
¾-inch	455	1.43	0.87½
1 -inch	193	2.48	1.40
1½-inch	105	3.85	3.78
Sidewalk Cocks:			
⅝-inch	1,139	0.97	0.72¾
¾-inch	79	1.34	0.85¾
1 -inch	6	2.35	1.45½
Soldering Nipples:			
⅝-inch	165	0.35	0.10
1 inch	240	0.42	0.13
1¼-inch	50	0.81	0.19
1½-inch	56	0.88	0.25

In some experiments carried out by W. C. Heraeus, the platinum manufacturer of Hanau, Germany, in 1891, iridium, when pure, has about the same hardness as steel hardened and drawn to a blue temper

A Simple Method of Making a Brass Plating Solution.

A very simple method of making a good brass plating solution, (and bronze solution too, if desired) is as follows:

Make up a good cyanide copper solution from cyanide and carbonate of copper so that it works well and keeps the anodes clean. It should not contain too much free cyanide, however, but just enough to clean the anodes while the current is running and no more This cyanide copper solution is used for the base of the brass solution.

The next step is to make up the following:

Water	1 gallon
Potassium Cyanide	2 lbs.

To this solution add plastic carbonate of zinc until it will take up no more. The dry carbonate of zinc can be used, but it does not dissolve as readily as the plastic carbonate. Care should be taken to ascertain that the cyanide solution will take up no more of the carbonate. When this is done it is ready to be added to the copper solution, but not all at once.

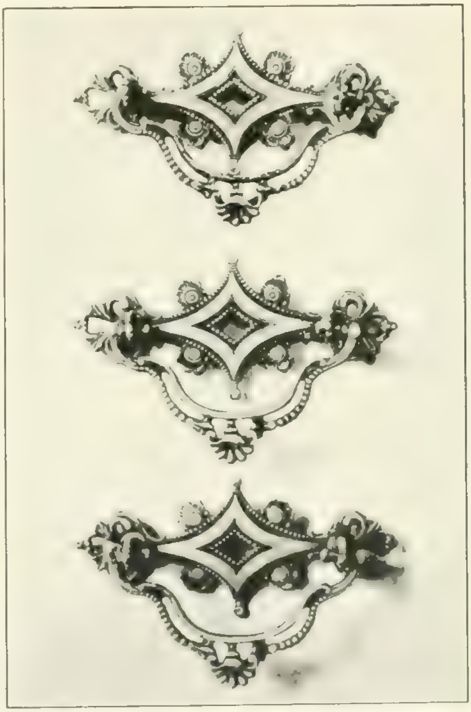
Add some of the cyanide zinc solution to the copper solution contained in a small tank or stone-crock. Then try it on a piece of work. Note should be made of the quantity of the cyanide zinc solution added as this will be of advantage later. After the small addition of the cyanide of zinc solution has been made to that of the copper and tried, the color of deposit produced will indicate what is going on. The deposit first obtained is bronze Then, as more of the cyanide zinc solution is introduced a green brass deposit (low brass) is produced. Finally a full yellow brass is produced.

When the right shade of color is obtained, either in the bronze or brass, a sufficient quantity of the cyanide zinc solution has been added Note should now be taken of the quantity of the cyanide zinc solution used. If, for example, 5 gallons of the copper solutions are taken and 1 gallon of the zinc solution is added, then this same proportion can be used for a large quantity. For instance, when 100 gallons of copper solution are to be made into one of brass, then 10 gallons for the zinc solution will be needed This feature renders the making of a brass solution from one of copper a safe and sure operation

After the brass solution has been made up and has been found to produce the desired color, then other additions such as bi- sulphite of soda, ammonia, etc., may be made. In the majority of instances ammonia is unnecessary, particularly if the brass is to be buffed. It is a source of much trouble in brass plating and many platers dispense with it entirely. It is possible to obtain a good deposit without it.

Use of the "Hypo-Nickel-Salt" Dip for Oxidizing Antique Brass.

Some good effects may be produced by the use of the well known "hardware-green" dip for oxidizing antique brass. It is easily applied and produces a dark green deposit on the brass that is quite effective. The brass to be oxidized is treated in the usual manner and as hot as possible:



Application of the Oxidizing Solution in Producing Antique Brass Goods.

Water	1 gallon
Double Nickel Salts	8 oz.
Sodium Hyposulphite	8 oz.

A temperature of about 150 degrees gives good results although if heated to a higher degree it works more rapidly.

The brass to be oxidized is immersed in the solution when it almost momentarily turns dark, slate green. It is then removed and rinsed. The "high-lights" of the design are then relieved by pumice and a wet tampico wheel in the manner usually practiced for antique or old brass wares. The relieving is very readily accomplished on account of the soft nature of the green deposit. The articles are then lacquered.

By the use of this dip for oxidizing brass which has a green shade some really beautiful results can be produced as the green color of the deposit harmonizes well with the metal. This dip, of course, is used without the current and should be made up fresh when it does not work well.

A Solution for Waxing Metals.

While lacquer is the best material for protecting the surface of metals and should be used on the majority of work, there are some instances in which wax can be employed with good results. It is particularly serviceable when used on imitation of antique wares, such as the verdes and similar finishes. It is preferably used in conjunction with a lacquer as the primary coat as will be subsequently described.

The best waxing material for such a purpose has been found to be a mixture of carnauba-wax and beeswax. Carnauba-wax itself is a hard, brittle material which takes a high polish; but it is not sufficiently soft for waxing metals. In order to overcome this hardness, it is mixed with an equal amount of beeswax. The two waxes are dissolved in turpentine so that the solution may be readily brushed over the surface of the metal. The following proportions are used:

Turpentine	1 pint
Beeswax	½ oz.
Carnauba Wax .	½ oz.

The carnauba wax and beeswax are melted in any convenient vessel, such as a tin cup or jar, and then, after removing from the fire, the turpentine is added and the whole stirred. Before adding the turpentine, it is advisable to allow the wax to cool down so that it is just barely liquid. In this manner it is possible to avoid the boiling of the turpentine when it is introduced with the accompanying loss. The waxing solution thus produced is kept in a bottle for use. When cool it will form a white liquid as some of the wax seems to separate out in fine flakes. This, however, does not interfere with its use. If the waxes are not pure, this is more apt to happen as pure canauba-wax and pure beeswax are soluble in turpentine. It is difficult, however, to obtain commercial wax that will dissolve in the turpentine to a clear liquid. There is not any objection to a slight amount of impurities so that a clear liquid is not produced, as the surface of the metals waxed with it shows no difference.

To use the waxing solution, the surface of the metal with the metal upon it (say, for example, a verde-antique finish) is first given a coat of flat lacquer. This serves to bind and hold the coloring material on the surface. After this has dried, a thin coating of the wax solution is spread over by means of a brush. Plenty of time should then be allowed for it to dry, as the turpentine is not a rapid drying material. Usually the drying takes a few hours and should be carried on in the cold air or in a slightly warm place.

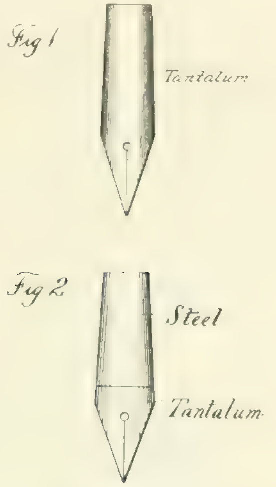
When the surface of the metal is dry so that it feels like hard wax, it is brushed over by means of a stiff bristle brush to even the coating and bring out the lustre. This operation must not be done before the surface is dry or poor results will follow.

When completed, the surface of the metal will have a peculiar half-dead surface which is quite pleasing. There is no other way of describing it except to say that it has a "wax-like" appearance. For antique work it is quite useful as it produces effects not otherwise possible to obtain.

Contrary to the usual belief, commercial pumice-stone does not come from active volcanoes, but from the Island of Lipari in the Mediterranean Sea. The greater portion of the pumice used is obtained from this source and while of volcanic origin, it is mined like other minerals. The mines are some 1500 feet above the level of the sea.

Tantalum Pens and Their Manufacture.

It is only within the past few years that a use has been found for tantalum, one of the most interesting of the rare metals. Werner Von Bolton of Charlottenburg, Germany found it can be used for the manufacture of electric light filaments and the Siemens & Halske Actien Gesellschaft of Berlin now employ it for this purpose in the production of their goods.



Sketch Showing Manner of Making Tantalum Pens.

Another new use for tantalum has recently been discovered by the aforesaid inventor who has found that it makes excellent writing pens. It is well known that steel pens corrode too easily and gold pens are not sufficiently stiff. The inventor, in a series of three patents recently issued to him (U. S. Patents 930,930 930,931 -930,932, Aug. 10, 1909) states that tantalum pens combine the hard, stiff qualities of steel with the non corrosive properties of gold. The tantalum may be rolled into sheet readily so that the pens can be manufactured in the usual manner. The inventor describes the manufacture of the pens in the following manner:

"Tantalum possesses like steel the property of being easily worked and hardened, and also offers great resistance to fracture, and has great flexibility or resilience. Its hardness can be increased to such a degree as to greatly exceed that of the best kinds of steel and even that of the usually employed stones. With regard to the greatest degree of hardness which it can attain, it is almost equal to the diamond. It has the further advantage over steel in being one of the precious metals which is not affected by the atmosphere, and which at ordinary temperatures completely resists the action of most acids. Although being harder than steel it is still more elastic than steel. All of these properties are of course of great importance in the article forming the subject matter of my invention."

"In the accompanying drawing, I have shown by way of example two forms of pens constructed in accordance with my invention."

"In order to be able to work the metal properly it must previously be well fused. By the fusing process the tantalum is freed from impurities and rendered homogeneous. The fusing is best accomplished by means of the electric current in a vacuum. After the metal has been thus melted it can be easily worked mechanically in any known manner. It can be hammered, rolled, drawn, filed and the like, and thereby brought into every desired form. When being mechanically worked, especially if it contains a small quantity of a hardening medium, the metal readily assumes so great a degree of hardness that further working is rendered impossible, and it must then be carefully reheated or annealed in order to be rendered soft again. In this annealing process care must be taken that the temperature does not rise too high, as otherwise the metal is more easily attacked by the oxygen of the atmosphere. The metal will, however, even in the form of the finest drawn wires or thinnest rolled bands stand a heating in the air up to a dark red temperature without being appreciably affected. When so heated the metal shows a coloration similar to tempered steel. In order to prevent too great a heating, especially of fine parts of metallic tantalum, it is preferable to effect the heating indirectly by bringing large plates or drums to the temperature to which the parts to be heated are required to be brought, and then to bring the objects of tantalum into contact with these plates or drums. If, on the other hand, it is desired to raise the objects of tantalum to higher temperatures without being materially affected on their surfaces, it is advantageous to effect the heating in a vacuum, as at very high temperatures metallic tantalum combines with almost all known substances. The heating in the vacuum is preferably carried out by electrical means, such as by electrical resistance, or directly by passing the electric current through the objects to be heated."

"Carbon in particular serves for this purpose, and it acts upon metallic tantalum in a similar manner as upon steel. In addition, however, other substances such as oxygen, hydrogen, silicon, boron, aluminum, titanium and tin can be used. In the case of carbon, the tantalum becomes very hard and resisting, even with the presence of a small fraction of a percent. Also, of the other substances mentioned, even small quantities are sufficient to produce great hardness. If the admixture of such hardening substances is increased materially beyond the said small proportions the metal generally becomes so brittle that no further working of it is possible. The extent of the permissible quantity of carbon or other known substances must be determined in each separate case according to the particular conditions and character of the substances chosen. If, for example, the tantalum is to be drawn into wire, particularly fine wire, or is to be rolled out into very fine bands or springs, the degree of hardness must be so chosen that the metal wire passing through the drawing dies or rolls will not be liable to crack. Especially in the drawing processes care must be taken that the drawing does not require an expenditure of force in excess of that which is admissible with relation to its resistance to fracture."

"A subsequent hardening of the already worked article of pure tantalum can be effected by heating the metal to redness in carbon in a similar manner to the treatment of steel."

Metal goods to be lacquered should be as clean as for plating as much of the peeling of lacquered goods is caused by the presence of a minute film of grease on the surface before lacquering.

Yellow brass chips are frequently adulterated by sand as the oil which the chips contain allows the particles of sand to become glued over so that they are quite inconspicuous. The sand is easily detected by dissolving a portion of the chips in nitric acid when it will remain undissolved.

The New "Monarch" Stationary Furnace with Lift-Out Crane.

The Monarch Engineering & Mfg. Co., of Baltimore, Md., have placed on the market their new "Monarch" stationary furnace with lift-out crane attachment which is a marked improvement in furnace construction. The furnace is herewith illustrated. It is of the stationary type, and is so constructed that it may be placed in pits, either singly or in batteries. Oil or gas is used as the fuel.

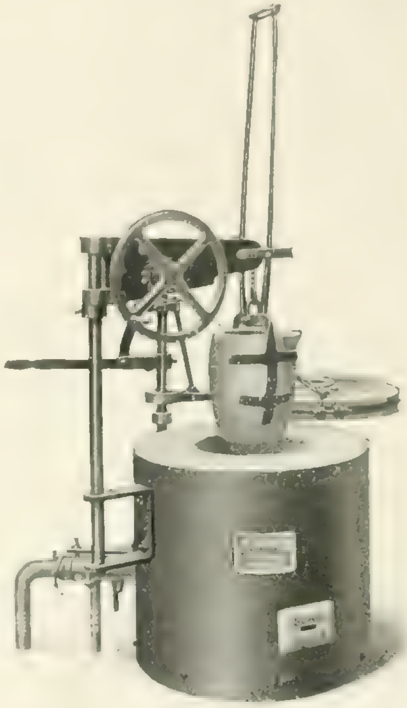


Fig. 1. Lift Out Device Showing Crucible Partially Lifted from Furnace.

The furnace is made circular and with the burner at the side. A crane arrangement operated by a hand wheel is fastened to the side by lugs. This device is made so that the tongs can be dropped into the furnace and the crucible grasped and pulled out without the need of the operator coming in contact with the fierce heat of interior of the furnace. The manner in which this is accomplished may readily be understood by referring to the illustrations. When the crucible has been lifted out by the crane, the whole may then be swung out of the way and the crucible deposited on the floor for skimming.

These furnaces are made in sizes to take from a No. 20 up to a No. 400 crucible and are operated, whenever desired, with a low pressure blower. The construction of the furnace is such that very reasonable prices are made upon them.

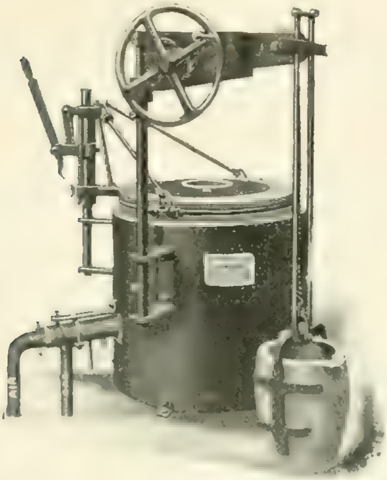
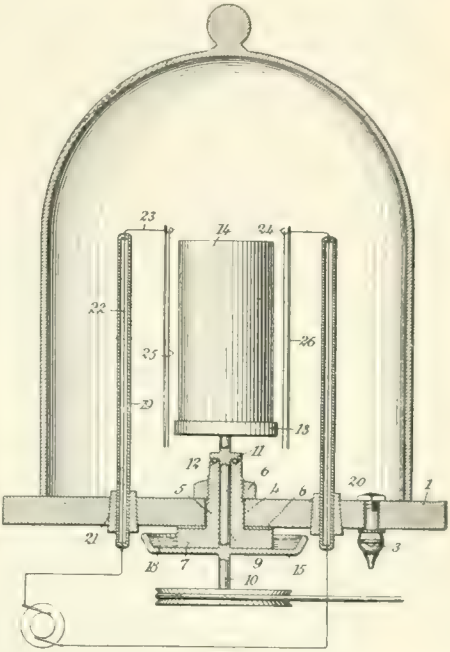


Fig. 2. The Device Shown When the Furnace is Closed.

Improved Method of Gold Plating Phonograph Records.

An improvement in the method of gold plating phonograph records in a vacuum to be used as master records, has been patented by James K. Reynard of East Elmhurst, N. Y. (U. S. Patent 929,017, July 27, 1909). The invention is intended to economize on gold and improve the method of rotating the record while the deposition is taking place.

The record to be gold plated is of wax or other non-metallic substance and is shown by 11 and is contained in a glass bell jar in which a vacuum is produced by an exhaust pump. The wax record is rotated by a pulley underneath the bell jar. Platinum wires 22 pass through the base plate, and inside the bell jar are protected by mica or glass shields 20, in front of which strips of gold 25 are hung. An alternating current is passed through and the gold volatilizes in the vacuum and deposits upon the wax record. The record is rotated while the deposition is taking place. It is claimed by the inventor that by the use of the screens 26, part of the deposition of the gold is cut off so that the waste of metal is reduced one-half. The remainder of the invention is upon the manner of forming the base plate so as to maintain the vacuum.



Manner of Plating the Record with Gold in a Vacuum.

Very little sulphate of copper (blue-vitriol) is now made except as a by-product. The chief sources are the electrolytic copper industry and the parting and refining of gold and silver. Another constant source of supply is from pickling vats used for pickling copper wire and sheet.

One of the principal difficulties encountered in brazing is from the use of crystal or unburnt borax. It swells up when heat is applied and takes some time to fuse down to a clear mass. The brazed joint is then porous. The borax used as the flux should previously be melted to a clear glass and then powdered. When thus used as the brazing flux it will not swell.

The Wm. H. Bristol Electric Pyrometer for Quick Readings at High Temperatures.

The "Wm. H. Bristol" electric pyrometers have become well known in many processes where temperatures lower than 2000 degrees are used. These pyrometers have been made in both switchboard and portable form to indicate or record high temperatures although most of the instruments now in service are for ranges of temperature lower than 2000 degrees. There are quite a number of processes in which excessively high temperatures are used and these temperatures should be measured intermittently in order to make control possible and to obtain a uniform product. In experimental work, temperatures in the neighborhood of 2500 degrees F. must often be measured, as for instance in boiler tests where the boiler furnace temperature is to be determined.

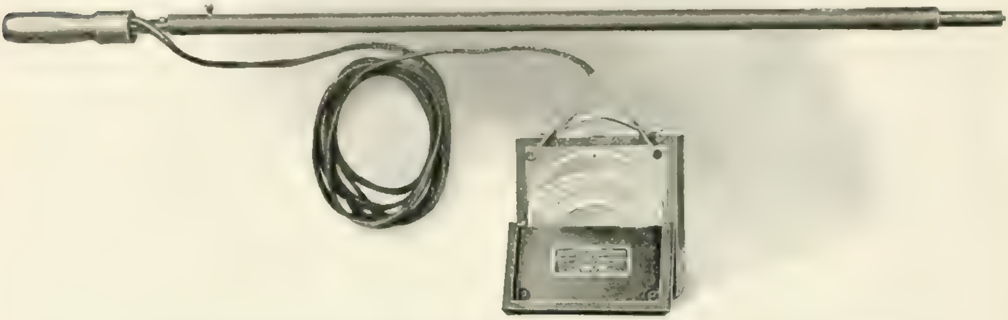


Fig. 1. The Wm. H. Bristol Portable Electric Pyrometer for the Quick Reading of High Temperatures.

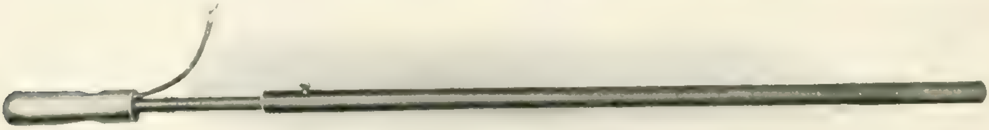


Fig. 2. The Thermo-Electric Couple with Protecting Sheath.

A new quick reading form of the "Wm H. Bristol" pyrometers has been designed and preliminary models tested in actual service in several different processes where the temperatures are excessively high and the requirements very severe. This special pyrometer consists of a patented compound thermo-electric couple used in connection with a special portable instrument equipped with a Weston pivot jewel-bearing movement. The complete outfit is shown in Fig. 1.

The thermo-electric couple is shown externally in Fig. 2. Fig. 1 shows the couple with the protecting sheath pulled back against a stop leaving the tip of the thermo-couple exposed. When a reading is to be taken with this special thermo-couple it is inserted into the furnace or kiln as shown in Fig. 2 with the tip protected from mechanical injury, and as soon as the couple has been inserted at the proper point in the kiln the iron pipe protecting sheath is slipped back, so that the tip is exposed to the hot gases whose temperature is to be measured. After a reading has been taken the couple should be quickly withdrawn and partially cooled off before another reading is taken.

This form of couple is the invention of Professor Wm. H. Bristol, formerly of Stevens Institute and now President of The Bristol Company. United States patents were issued July 5, 1904 and August 29, 1905. The compound construction of this couple is shown in Fig. 3. The point "A" corresponds with the regular junction of an ordinary thermo-couple and the two elements which join at the point "A" are platinum and platinum rhodium this being the particular couple selected as a standard by the German Government. The platinum and platinum-rhodium elements extend to the points B and C where they are welded to two other wires made of inexpensive alloys and which are such that the electro-motive forces generated at B and C are junctions are both exposed to temperatures not higher than 1200 degrees F. These inexpensive alloy elements are extended to the point D which is the cold end of the couple.

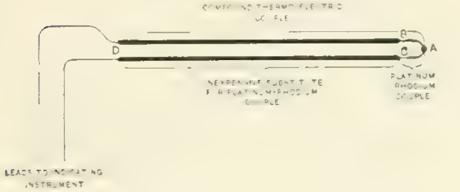

COMPOUND THERMO-ELECTRIC COUPLE
B
D
C
A
INEXPENSIVE SUBSTITUTE FOR PLATINUM-RHODIUM COUPLE
PLATINUM RHODIUM COUPLE
LEADS TO INDICATING INSTRUMENT

Fig. 3. Sketch Showing Manner of Constructing the Pyrometer.

This construction of the quick-reading couple is such that the platinum-rhodium tip of the couple A may be exposed to excessively high temperatures up to 3000 degrees F. without having the temperature of the junctions B and C exceed a safe limit. The temperature at A may be quickly measured with this special couple as the platinum-rhodium tip is exposed directly to the hot gases in the furnace or kiln. In this way an inexpensive substitute is provided for the expensive platinum-rhodium couples previously employed for the measurement of such high temperatures.

This quick reading form of the Wm. H. Bristol Electric Pyrometers with the patented compound couple has been tested under very severe conditions and found extremely valuable for such applications as brick kiln temperatures, boiler furnace fire box temperatures, by-product coke oven combustion flue temperatures, soaking pit temperatures, etc. The complete outfit is portable and readings of temperatures in the neighborhood of 2500 degrees may be obtained in a very few seconds after inserting the tip of the couple to the point where the temperature is to be measured. By using a special form of the platinum and platinum-rhodium tip this type of thermo-couple can be used to measure the temperature of red hot surfaces of metal or other material.

Recent Development in Continuous Annealing and Hardening Furnaces.

The internally-fired, rotary annealing and hardening furnace of the Rockwell Furnace Co., 26 Cortlandt St., New York City, has recently been improved so that greater flexibility is obtained in the range of work handled by it, and its durability is also increased.

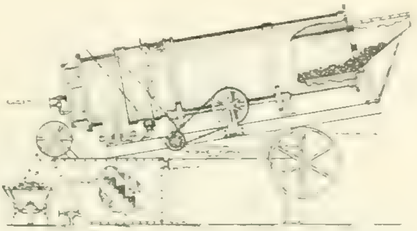


Fig. 1. The Furnace Tilted So as to Deliver the Product Continuously.

The helical lining of fire-brick is retained only for certain classes of work of a smooth nature or of small size. For long pieces, such as bolts, rivets, etc., or irregular shaped steel punchings, forgings or castings, other methods of feeding are required and the furnace has been designed to conform to such work.

In the present form of furnace for smooth or round work, the interior is lined with a smooth, refractory brick, and the furnace is mounted in such a manner that the gradual incline causes the material to feed forward.

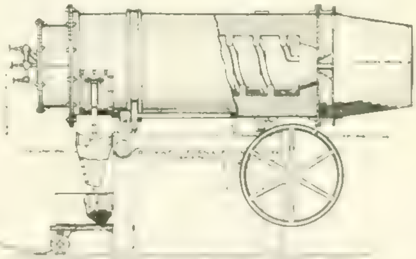


Fig. 2 The Helical Arrangement of the Interior Fire-Brick for Special Work.

By means of a hand wheel the pitch of the furnace may be altered so that the speed at which the material passes through the furnace may be regulated. The time of heating is therefore, likewise regulated.

In operation, the pieces to be heated are fed continuously into one end of the furnace cylinder. The furnace is fired internally from the opposite end with the zone of highest temperature at the discharge end. The cylinder is revolved at a slow speed from 1 to 4 revolutions per minute, and as the furnace is inclined, and at the same time revolves, the pieces being treated, gradually pass forward to the discharge end where they enter a receptacle or hardening bath as may be desired. If desired, the discharge spout may be carried below the level of the bath thus insuring freedom from oxidation. Oil or gas is used for the fuel. The furnaces are built in a number of sizes for a wide range and are capable of handling up to 2000 lbs. of work per hour.

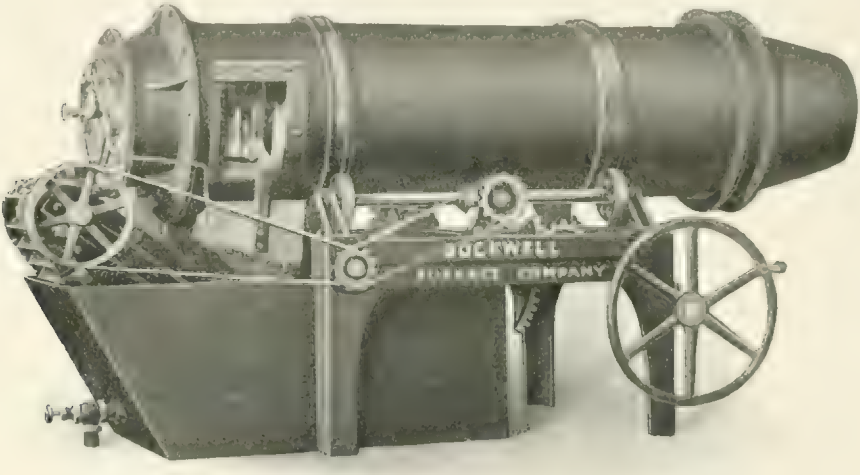


Fig. 3. Rotary Annealing and Hardening Furnace Made by the Rockwell Furnace Co.

Graphite Kettles for Galvanizing.

The use of graphite kettles for galvanizing or tinning has been patented by Henry M. Huxley, formerly with the American Steel & Wire Co. of Worcester, Mass., and assigned to them (U. S. Patent 928,385, July 20, 1909.) It is well known that molten zinc acts on iron galvanizing kettles and produces the well known zinc dross (an alloy of zinc and iron). The use of graphite kettles is to avoid this action.

In order to overcome the oxidizing action of the fire used for heating the graphite kettle, it is immersed in an iron kettle containing molten lead so as to keep it away from the air. The method of doing this may be understood by reference to the illustrations. The kettles are intended more particularly for galvanizing wire as this constitutes the product of the company operating them. In Fig. 1 is shown a kettle for such wire. The graphite kettle 4 contains the molten zinc

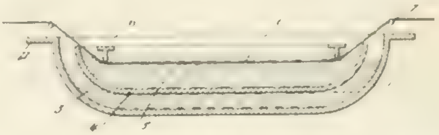


Fig. 1. Graphite Galvanizing Kettle Surrounded by Molten Lead to Protect It.

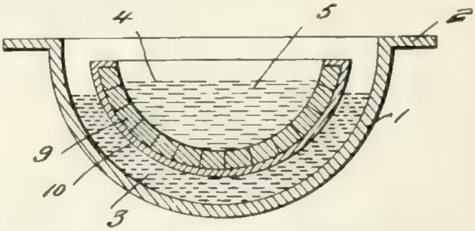


Fig. 2. Manner of Making the Kettle in Sections.

while the iron kettle 1 is filled with molten lead 3. The wire passes through in the usual manner.

The graphite lining may be made solid as shown in Fig. 1 or sectional as illustrated in Fig. 2. The graphite used is the regular crucible mixture composed of Ceylon graphite and clay.

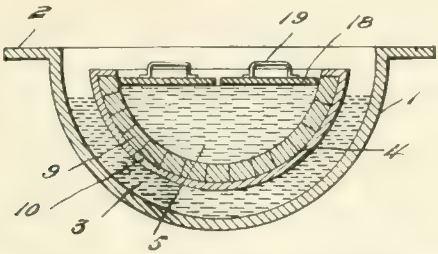


Fig. 3. Kettle with Graphite Covers to Prevent Oxidation.

An auxiliary feature of the invention is in the covers used on the surface of the molten zinc to prevent the air from coming in contact with it and producing oxidation. These are shown in Figs. 3 and 4. They are made sectional so as to be readily removed when necessary and are of the graphite material like the kettle.

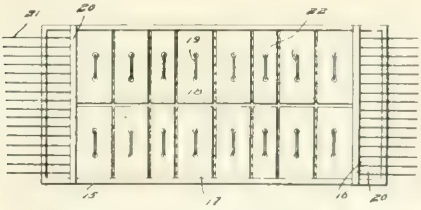


Fig. 4. Graphite Covers Plan View) Showing Use on Wire Galvanizing Kettle.

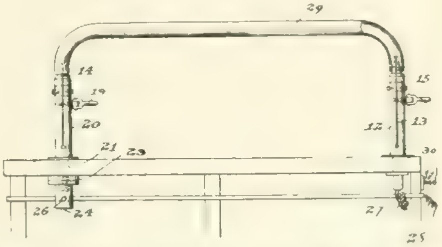
The use of graphite for galvanizing kettles was described in THE BRASS WORLD, June 1907, page 186 and reference was made to this invention which had then been in use for a short time at the plant of the American Steel & Wire Co., at Worcester, Mass. The patents have only recently been granted.

The term "zinc-dross' is a misnomer as it is not dross at all, but an alloy of zinc and iron. When the zinc is allowed to come in contact with iron, some is dissolved, the melting point of the zinc is raised and the alloy of zinc and iron becomes pasty at the melting temperature of the zinc. It is then removed from the zinc kettle in the form of a pasty mass which is called zinc-dross.

Heating Brass Bedstead Tubing for Lacquering.

In the manufacture of brass bedsteads, it is customary to use what is known as a "gum lacquer" for the reason that, inasmuch as it is applied hot, a large number of coats may be put on and a very durable finish produced It is, of course, needless to say that lacquering by this method is expensive.

Wm. W. Vincent of the Simmons Mfg. Co of Kenosha, Wis., makers of brass bedsteads, has invented and patented a device for holding and heating brass tubing by electricity while the lacquering is taking place. (U. S. Patent 928,291, July 20, 1909). As well known, the brass tubing must be heated while this kind of lacquer is applied in order immediately to evaporate the alcohol. Otherwise the previous coat will be removed.



Electric Device for Heating Brass Bedstead Tubing for Lacquering.

In the sketch, herewith shown, a portion of bent tubing is illustrated resting upon the terminals 14. These are made so that they expand and form a good electrical contact. A current of electricity, sufficiently strong to heat the tube, is passed through, and then the lacquering is carried on while in this heated condition. By means of a suitable rheostat, the quantity of current which passes may be regulated, and the heat is thus regulated at the same time.

Solutions used for dip silvering should be thrown away when they cease to produce rapid and satisfactory silver coatings on brass or copper as it is unwise to attempt to replenish them by new silver salts. They have become contaminated by brass or copper which has dissolved each time the solution is used, and the only satisfactory method is to throw the old solution away and make a new one.

Questions and Answers.

QUESTION No. 682. What method is used in the East in casting architectural bronze work? In the West, where we are located, we have been unable to make castings that will compare favorably with those manufactured in other sections of the country.

Answer. The architectural bronze work made in the East is carefully made by molders skilled in the art, which, of course, accounts for its superior quality. In making such work new metals should always be used, as the cost of the metal is of small importance compared to the loss which would result from bad work. In using new metals the danger of loss is reduced to a minimum. The mixture of these metals is also of much importance as too much tin will cause dirty castings and too little tin will make the metal run so sluggishly that it will be apt to chill before it fills all of the fine detail of the mold. A mixture for this class of work is one that will run freely and give good, clean castings. You will find the following one excellent and extensively used for this purpose:

Copper	89 lbs.
Tin	7 lbs.
Lead	2 lbs.
Zinc	2 lbs.

The mold should be made with a facing of fine sand next to the pattern in order to produce a smooth casting, then skin-dried before casting. This will prevent the chilling of the metal by the wet sand. As architectural castings are usually quite thin, unless the mold is skin-dried, they are difficult to run.

QUESTION No. 683. Kindly inform be about the method of polishing and grinding flat-irons? We have quite a number to polish and find that on grinding the castings it is impossible to keep the surface even. We grind on a carborundum wheel with a 2-in. face. If you can give us any information as to the quickest and best way of grinding the bottoms of the flat-iron it will be appreciated.

Answer. The customary manner of polishing flat-irons is on a large wheel from 24 to 36 inches in diameter. The use of a solid wheel of this size is not satisfactory and a wood wheel with the emery glued on the face is employed for the work. The face of the wood wheel should be as wide as possible. To the outside a strip of leather is glued in the usual manner of making such wheels, and over this leather the emery is glued. You can cut down on a wheel with No. 70 emery and then with No. 120, after which the finishing is done with flour emery. The character of the iron surface will determine the grades of emery to be used on the wheels, and you can easily find what numbers are the best suited for your work. The use of the leather covered wheels will prevent "bumping" and allow the surface to be ground evenly.

QUESTION No. 684. Will you please inform me how to produce the different bright colors on steam metal globe and gate valves.

Answer. The color found on the best grade of steam metal valves is produced by plunging them in water while hot. As soon as the mold in which they are cast is fit to be dumped, the cope is taken off, and the gate of castings taken by a pair of tongs and plunged into cold water. This serves to blow the core out and also produce the rose color on the surface of the steam metal. If the water is cold a better color is obtained than when it is hot.

QUESTION No. 688. Is there a non-shrinkable aluminum alloy that can be used for making aluminum stove patterns? If so we should like to use it. We are using a mixture of aluminum and zinc that gives good results except that it shrinks too much. We want the casting to be of the same size as the pattern.

Answer.—You will not find any aluminum alloy that will not shrink and you cannot have your castings the same size as your patterns. The best mixture for your patterns consists of 93 per cent. of aluminum and 7 per cent. of copper. This mixture casts well and shrinks about 3/16 in. to the foot.

QUESTION No. 689. Is the mixture known as "Pewter" supposed to contain lead? The French Government has recently passed a law requiring that all containers for meat food products must contain no lead. Many of the published analyses show lead to be a constituent of pewter and the requirements of the French law states that the soldering must be done with pewter.

Answer. There is nothing yet published or no information or authority known to indicate that pewter should contain or not contain lead. The majority of the pewters of older times contained lead and that made to-day contains it. Britannia metal as made to-day is really pewter containing no lead at all. In England, during the early times, laws were passed regulating the quantity of lead in pewter, but there is nothing to indicate that it was necessary to use it. The object of employing lead is to cheapen the metal. Our opinion is that a pewter may or may not contain lead. In other words, there is no authoritative formula for it.

QUESTION No. 690. What is the black scum that collects on the zinc anodes in an electro-galvanizing solution?

Answer. This is the impurities in the zinc and is composed principally of lead, which is contained in greater or less amount in all commercial zinc. The only method of removing it is to scrape or scour it off.

QUESTION No. 691. Can bismuth be purchased in the form of sheet and wire?

Answer. Bismuth cannot be rolled or drawn as it is too brittle. In fact, it is so brittle that it may easily be powdered. To be rolled or drawn, metals must be malleable and ductile and bismuth lacks this property.

QUESTION No. 692. Can boron carbide be purchased in the United States? We understand that it is much harder than carborundum and can actually be used to cut the diamond.

We may be able to use it in grinding hard steel.

Answer. Boron-carbide is not made commercially and can be purchased only through chemical dealers. It is harder than carborundum (silicon carbide), but not enough to warrant its extra cost.

QUESTION No. 693. Is the double chloride of nickel and ammonia used at all in electroplating? We understand that it will deposit nickel more rapidly than the double sulphate of nickel and ammonia.

Answer. As far as known, the double chloride of nickel and ammonia is not used commercially in nickel plating, although it was employed in former times. We doubt whether any better nickel deposits can be obtained with it, or in a more rapid manner than it is possible to obtain with the double sulphate.

QUESTION No. 694. We have purchased a considerable quantity of sheet brass and cannot obtain good brass castings by melting it. The castings obtained by melting the sheet are dirty and full of spots of oxide of zinc. The surface has a white appearance. We had always believed that sheet brass is a preferred material for brass foundry use as only the best grade of copper and spelter could be used in making it. The sheet brass has a sort of golden color and we send a piece of it to you for inspection. What is the cause of the imperfect castings?

Answer. An inspection of the sample of your sheet brass shows it to be a variety called "Muntz-Metal" which is used for hot-rolling. In order to do this satisfactorily, it is necessary to make the mixture so that it contains practically 60 per cent of copper and 40 per cent of zinc. It will be noticed, therefore, that the brass contains altogether too much zinc for sand casting purposes. It is usually considered that 70 per cent of copper is as little as can be successfully employed for such work. Your difficulty, then, is that there is too much zinc in the brass. This is easily remedied by taking 3 parts of the sheet metal and 1 part of copper. Such a mixture will give about 70 per cent of copper so that a good casting mixture will be had.

QUESTION No. 695. We have attempted to japan some small brass goods made of brass wire and the results were not satisfactory. The japan did not come out black. We notice that there are large quantities of black goods sold with a black japan finish, such as eyelets, safety pins, etc., which have a pure black color, and assume that it is possible to obtain it. Is our japan at fault, or is it in the baking?

Answer. Your difficulty is not in the japan or in the baking, but in the fact that you should oxidize the brass articles before japanning so as to obtain a base upon which the japan can be applied. Japan is applied in a rather thin coating to such goods, and it is more or less transparent. The yellow color of the brass underneath, therefore, produces a light shade on the japanned goods. The manner of overcoming it is to oxidize the brass underneath. It is customary for such work to use the well known "black-brass" dip. It is made by dissolving in aqua-ammonia, all the carbonate of copper it will take up. This dip is used hot. The articles turn black, and after rinsing and drying are ready for the japanning. Japanning upon such oxidized work is a pure black.

QUESTION No. 696. Is brass melted in an oil furnace with an oxidizing flame more apt to tarnish when exposed to the air than that melted with a reducing flame? We have some red metal goods in the form of faucets, cocks and similar plumbers' brass goods which have tarnished badly upon exposure to the air and would like to know whether it is caused by our oil furnaces.

Answer. As far as known there is no difference in the tarnishing qualities of the brass melted under these conditions. We see no reason why there should be. In order to settle the question, however, a series of experiments would have to be made. Little is known about the matter.

QUESTION No. 697. In electrogalvanizing, we note that much stress is laid upon the use of "pure" zinc for anodes. Will you inform us what the disadvantage is of using commercial zinc for this purpose and what is known as "pure" zinc and where can it be obtained?

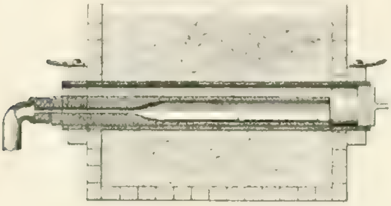
Answer. The object in using as pure zinc as possible is to prevent the formation of a coating on the surface after the anodes have been in use for a short time. This coating is caused by the presence of lead in the zinc. It does not dissolve, and forms an insoluble crust on the surface which finally impedes the passage of the current. Frequent scrubbing is then necessary. While it is impossible to obtain any zinc which does not contain some lead, some of the cheap grades contain quite a large quantity. The so called "pure" zinc is that which is as low as possible in lead. For anode work it usually runs about 0.50 per in this metal, but if less can be obtained the anodes will be all the better for it. Theoretically, chemically pure zinc would be the best, but it cannot be obtained commercially, except at a high price.

QUESTION No. 698. What percentage of iron in zinc constitutes zinc dross, and what is the principal source of the iron?

Answer. When the iron reaches about 2 per cent, the zinc commences to thicken and forms dross. It may be said that ordinary zinc dross contains from 2 to 4 per cent of iron. The principal source of the iron in the dross is the iron kettle in which it is melted. As the bottom of the kettle becomes quite hot, the molten zinc attacks it readily. The stirrer and skimmer also introduce some iron, and work that is being galvanized is likewise a source.

Patent Abstracts.

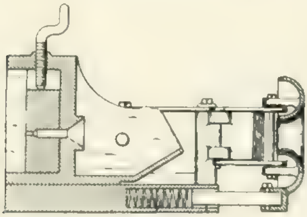
929,578, July 27, 1909. TREATING METAL FILAMENTS. Carl T. Fuller of Schenectady, N. Y. Assignor to the General Electric Co. of the same place. A method of mak



ing tungsten filaments for incandescent lamps. Oxide of tungsten is mixed with corn-starch so that the mass contains about 3 parts of oxide to 1 of starch and then heated in an atmosphere of hydrogen gas. This acts as a reducing atmosphere and the filament then consists of metallic tungsten. The filament is squirted through a die before heating. This forms it

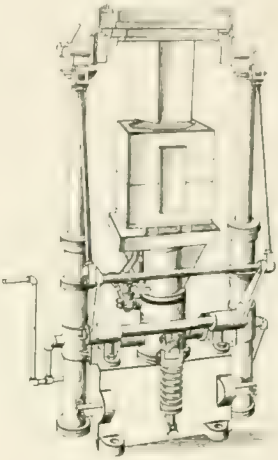
930,723, August 10, 1909. PROCESS OF FORMING ELECTRIC INCANDESCENT LAMP FILAMENTS. Werner Von Bolton of Charlotteburg and Felix Hartman of Berlin, Germany. Assignors to Siemens & Halske, A. G. of Berlin, Germany. A method of making tungsten lamp filaments by inserting the powdered tungsten in a steel tube and then drawing the tube to the desired size. The steel coating is then removed with acid and the tungsten is left.

929,985, August 3, 1909. WIRE-DIE SAFETY APPLIANCE. Juan H. Reece of Joliet, Ill. Assignors to Humphrey & Sons, of the same place. An apparatus designed to cut,



break or sever the wire, while it is being drawn through the die, in case it becomes accidentally entangled around the limbs or body of the wire drawer. In this manner the operator is saved from injury.

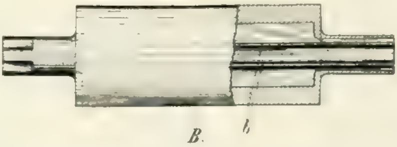
13,012 (re-issue), August 17, 1909. JARRING MACHINE. Wilfred Lewis of Philadelphia, Pa. Assignor to the Tabor Mfg. Co., of the same place. This is the re-issued patent



on the original jarring molding machine made and patented by the inventor in which the sand is rammed in the flask by "jarring" it by means of a series of jolts produced by automatic mechanism.

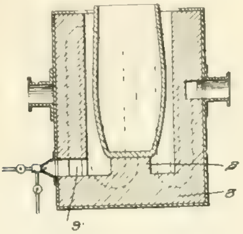
928,946, July 27, 1909. MACHINE FOR REDUCING THE WALLS OF TUBULAR BILLETS AND FOR OTHER USES. Leonard D. Davis of Erie, Pa. A machine for making hollow billets from solid ones by the piercing method, or for rolling those already pierced to a thinner gauge. The essential feature of the invention lies in the rolling and feeding mechanism.

928,768, July 20, 1909. ROLLING MILL. Hugo Keitel of Dusseldorf, Germany. A hard cast-steel roll with a channel cast through



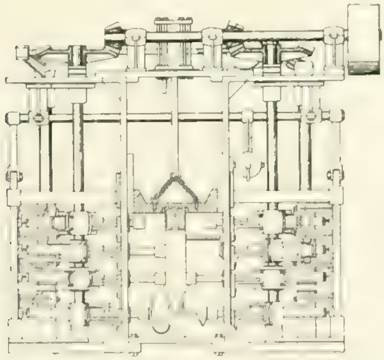
the center. The channel is formed by casting the roll around steel shapes in any desired form inserted in the mold in the form of a core. The object of this method of making is to avoid the breakage of the roll while in use.

929,831, Aug. 3, 1909. MELTING APPARATUS. William M. Carr of New York City. A tilting crucible furnace for melting all classes of metals, particularly those with a high melting point like steel. An air chamber traverses the lining and ends at the burner. The air supplied to the burner for promoting the combustion passes through this chamber or duct and is heated so that hot air is supplied to the oil. At the same time the air passing through the duct cools the lining. It is stated that the construction enables a high temperature to be produced in melting.

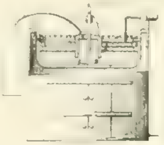


929,701, August 3, 1909. FURNACE. William M. Page of Philadelphia, Pa. Assignor to the Duplex Metals Co. of New York City. A furnace of the reverberatory type used for melting metal in which iron or steel is to be dipped for coating it and making the so called "Monnot" metal (i. e. copper coated steel.)

930,892, August 10, 1909. MACHINE FOR REMOVING CORES FROM CASTINGS. Frederick M. Sharp and L. W. Williams of Sharon, Pa. A machine for removing cores from sand castings. The casting is held rigidly so that the core sand will run out, and then beaten automatically by a number of hammers operated by cams so that the sand is loosened and falls out.



929,747, August 3, 1909. STEREOTYPE CASTING APPARATUS. Henry F. Bechman of Battle Creek, Mich. Assignor to the Duplex Printing Press Co., of the same place.



The object of this invention is to allow the use of a single melting pot and pump to supply a series of casting boxes. The pump is adjustable so that it can deliver metal to any of the adjacent casting boxes. The apparatus is intended for casting stereotype plates.

931,092, August 17, 1909. ELECTROLYTIC PRODUCTION OF MAGNESIUM. George O. Seward and Franz Von Kugelen of Holcombs Rock, Va. Assignors to the Virginia Laboratory Co. of New York City. The use of a bath of magnesium chloride and barium chloride is claimed for the electrolytic production of magnesium. The use of the barium chloride renders the bath heavy so that the magnesium reduced, readily floats to the top of the melted mass and can be collected

931,579, August 17, 1909. SAND BLAST BLOWER. Diederich A. M. Doublet of Eimsbuttel, Germany. A modification of sand-blast apparatus in which the improvement is in the means for delivering the sand.

928,470-929,687-929,688-929,777-929,778, July and August, 1909. FURNACE AND MOLD. John F. Monnot of New York City and the Monnot Metallurgical Co., of the same city.

Fig. 1.

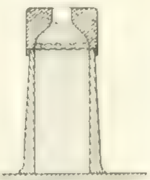
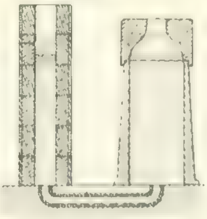


Fig. 2.



These patents relate to the apparatus in the form of furnaces and molds for coating steel with copper by the process of dipping it in the molten metal. Special forms of apparatus are used covered by the patents.

Trade Items.

The American Vanadium Co., is doubling the capacity of their plant at Bridgeville, Pa., by the erection of new buildings.

The Monarch Valve & Mfg. Co., of Warren, Mass., manufacturers of bronze and iron valves, are considering a proposition to move their plant to Chicopee, Mass.

The Risdon Tool Works, Inc., of Waterbury, Conn., manufacturers of tools and metal goods, have gone into the hands of a receiver. Lewis A. Platt of the Platt Bros. Co., of Waterbury has been appointed receiver.

Construction of the new brass foundry of the Maxwell-Briscoe Motor Car Co., at Tarrytown, N. Y., has already been commenced. It will be 70 x 80 feet. When completed it is expected that a capacity of about seven tons per day of brass and aluminum castings will be had.

The American Lead Co., of Pittsburgh, Pa., have completed their new plant at 3112-3114 Penn. Ave., in that city and will shortly commence the manufacture of lead pipe. The building is 40 x 100 feet and has been equipped with all modern appliances for this class of work. Solders and other white metals will be manufactured. The Pittsburgh White Metal Co., is interested in the company.

The Hanson & Van Winkle Co., of Newark, N. J., announce to the trade that they are now selling the American process of cold galvanizing without royalties of any kind, and will gladly demonstrate its merits if samples of work are sent to them. These will be electrogalvanized free of charge. Samples of their work done in the solution will be sent whenever desired. They have made a particular study of electrogalvanizing, and their solutions and character of work should be investigated by all who do hot galvanizing as there are many instances in which the cold process can be used with satisfactory and economical results.

Attention is called to the new flux "Homogen" recently placed on the market by the Allyne Brass Foundry Co., of Cleveland, Ohio. This flux is entirely new in principle. It is composed of brass filings coated over with a special composition and is placed in the crucible with the metal to be treated. This allows the flux to act in the most favorable manner. It is used not only for rendering castings sound, but also eliminates the iron in brass or bronze. In manganese-bronze it is also very advantageous. For valves and other work to stand pressure, it is of special value, as repeated tests have shown that less leakages result when used. This flux has been in use by the Allyne Brass Foundry Co., for some time, who found it so satisfactory that they decided to place it upon the market for general sale.

The plant of the American Hardware Mfg. Co., of Ottawa, Ill., was recently destroyed by fire with a loss of $125,000.

Thomas J. Dee & Co., of Chicago, Ill., gold and silver refiners and sweep smelters, are now occupying their new plant recently built at 317 East Ontario St.

The Canton Brass & Machine Co., has been organized with a capital stock of $50,000, has taken over the plant of the Canton Brass Co., of Canton, Ohio, and will conduct a brass foundry and machine shop.

A new factory has been secured at Bradford, Pa., by the American Metal Door Co. of Jamestown, N. Y., and the plant will shortly be moved to that place. A site in Bradford was secured through an offer to exempt the company from taxes for a number of years.

The Eberton Brass Foundry Co., has been organized by John H. Cochrane and Henry Rabe of York, Pa., for the manufacture of brass, bronze and aluminum castings. A foundry has been established on Worth St., near Highland Ave., in that city. Mr. Cochrane has had charge of the brass foundry of the Pennsylvania Foundry Co., for the past two years and Mr. Rabe is also an experienced foundryman.

The Meaker Company, 218 North Elizabeth St., Chicago, Ill., are now placing upon the market the "Meaker Self-Sustaining" electrogalvanizing solution which is a novelty in its line. In order to demonstrate what the solution will do, this company offers to galvanize samples free of charge and pay expenses of transporting them. The samples will then demonstrate what can be done in this line. This offer is a sufficient guarantee of the character of their galvanizing solution. They are prepared to sell the solution or electrogalvanize work. They are also manufacturers of ingenious automatic apparatus for handling work during electroplating so that the minimum amount of labor is required.

A consolidation of plants making aluminum castings has recently been effected and which is creating much interest in the trade. The Aluminum Castings Company has been incorporated in Cleveland, Ohio, with a capital stock of $800,000 and the following plants have been taken over: The Allyne Foundry Co., of Cleveland, Detroit, and Buffalo; The Syracuse Aluminum & Bronze Co., of Syracuse, N. Y.; The Eclipse Foundry Co., of Detroit, Mich.; and the foundry department of the United States Aluminum Co., of New Kensington, Pa. The plants will be operated as heretofore. New plants will be built in Detroit and Cleveland to take care of the increased business expected. This consolidation is evidence of the belief in the future of aluminum held by the progenitors of it.

The United Brush Co., of Pawtucket, R. I., has gone into the hands of a receiver and the business will be wound up.

The Simplex Motor Car Co., of Mishawaka, Ind., have completed plans for large additions to their plant. It is stated that $400,000 will be spent in the improvements.

James W. Carr of Richmond, Va., is building a new foundry to cost $7,000 in which iron and brass castings will be made. It is located on 25th St., in that city.

The Geo. L. Fish Electric Co., has been incorporated at Lafayette, Ind., with a capital stock of $25,000. Electrical specialties will be manufactured.

The new brass foundry of the Nelson Valve Co., of Chestnut Hill, Philadelphia, Pa., which is under construction, is to be 48 x 200 feet and the brass finishing shop 48 x 250 feet. A chemical and testing laboratory 32 x 35 feet will also be erected. The whole plant is to consist of ten buildings of reinforced concrete.

Plans have been drawn up for the new plant of the Climax Mfg. Co., which will be moved from Seneca Falls to Schenectady, N. Y. The foundry will be 40 x 140 feet. The manufacture of plumbers' brass goods is carried on and the new plant will give increased facilities for manufacturing their product.

The L. A. Badge & Mfg. Co. of Los Angeles, Cal., are now manufacturing buttons, badges and medals of all kinds for the advertising and society trades. They are carrying on electroplating in connection with their work. The factory is located at 342 South Broadway and the office at 140 South Main St.

The mill formerly occupied by the Western Foundry Supply Co., at Elizabethport, N. J., has been purchased by Robert Gilchrist & Co., who have just been incorporated to conduct a business along the same lines. The grinding of ferro alloys and manganese di-oxide will be carried on so that the same product as that produced by the Western Foundry Supply Co., will be sold. The plant of the old company was purchased by Robert Gilchrist & Co., from the receivers, and they have established an office at 50 Church St., New York City.

Particular attention is called to the new "Baird" tumbling barrel for use in tumbling small metal goods with steel balls. These barrels were designed particularly for this purpose, and after a study had been made of the problem. The barrels are lined with hard wood so that the work is not abraded in any way, and are made in pairs so that one may be filled while the other is in operation. They are made so as to tilt when desired, by means of an easily operated device, and the charge of balls and work may then readily be dumped into a convenient receptacle. The rapidly increasing use of steel balls for tumbling, should cause all metal goods manufacturers to take a lively interest in this barrel. The barrels are made by The Baird Machine Co., of Oakville, Conn.

The Leslie Mfg. Co., 17 Medford St., Boston, Mass., have installed new machinery and are now manufacturing a new safety razor.

The Philadelphia Art Metal Co., has been incorporated at Camden, N. J., with a capital stock of $50,000, to manufacture art metal novelties.

The copper rolling mills of Hendricks Bros at Belleville, N. J., one of the oldest sheet copper mills in the United States, was burned on August 13th, with a loss of $60,000.

The Hardware Supply Co., of Grand Rapids, Mich., manufacturers of hardware-specialties, cabinet-hardware, etc., have outgrown their present quarters and are now erecting a new building for their own use at a cost of $14,000.

The Metal Dross Economy Co., of Bristol, Conn., report that they have settled out of court with one concern in the Naugatuck Valley which had been infringing upon their patent process of skimming dross into water. They also state that they are prepared to protect all concerns operating under license from them and to prosecute infringers.

The stockholders of the Chapman Valve Mfg. Co., of Indian Orchard, Mass., recently voted an increase in their capital stock of $400,000 to be applied to the purchase of the Pratt & Cady Co., of Hartford, Conn. The consolidation of the two plants has been in contemplation for some time and this is the first step, previous to the ratification of the combination by the stockholders of the Pratt & Cady Co.

The Abbott Ball Co., 14 Hicks St., Hartford, Conn., manufacturers of steel balls for tumbling purposes and tumbling barrels for use with them in burnishing work by this process, have recently improved their tumbling barrel so that it is even more serviceable than before. The original principle, which renders the barrel so useful and rapid in tumbling with steel balls, has been retained, and the outside has been strengthened. This barrel is now ready for the market and will be illustrated in the October issue of THE BRASS WORLD.

Attention is called to the new model of "Hill" Cinder Crusher now made by the Eastern Machinery Co., of New Haven, Conn. This new type of machine is a small one suitable for brass foundries which have limited quantities of ashes to wash. The machine is quite reasonable in price and there is no brass foundry, however small, that can afford to be without it. They will then be able to save all metal possible in their foundry cinders. The machine has been designed with the view of enabling the small brass founder to save the metal that would otherwise be sold to the scrap metal dealer at a price far below its value. The Eastern Machinery Co., are also manufacturing the large size "Hill" crusher for use in larger establishments and also supply repairs for previously made machines. They are the successors to A. M. Hill, the inventor and patentee of the crusher.

The Gillette Safety Razor Co., of Boston, Mass., are considering the establishment of a plant in Newark, N. J., but have not yet concluded plans for it.

The [illegible] Arms Mfg. Co., now of Norwich, Conn., are to erect a large factory in Woodstock, Canada, for the manufacture of small arms.

The Tungstolier Co. of Canada, Ltd., has been incorporated in Toronto, Canada, with a capital stock of $40,000 to manufacture electric fixtures for tungsten lamps.

The Parks Window Balance & Lock Co., has been organized at Fargo, North Dakota, with a capital stock of $100,000 to manufacture builders' hardware. A window sash lock will be the chief product. A factory will be built or purchased in some suitable location in that vicinity.

The plant of A. Weiskittel & Son, at Highlandtown, Md., is being enlarged by an addition 100 x 150 feet to contain 10 enameling furnaces. A new office building will also be erected. This company manufacture plumbers' goods, iron pipe and enameled goods and also operate a brass foundry.

L. H. Gilmer & Co., of Philadelphia, Pa., manufacturers of the "Gilmer" endless polishing belts, have moved to 57 North Seventh St., in that city where larger quarters have been obtained. This move has been necessary in order to meet the growing demands of the business.

Owing to the new system of house numbering which is now taking place in the city of Chicago, the numbers of the factory and offices of G. J. Nikolas & Co., the well known manufacturers of lacquers, have been changed from 400 to 402 W. Van Buren St., to 1227 to 1229.

The Hanson & Van Winkle Co., of Newark, N. J., are sending out to the trade their Bulletin No. 119 describing the lacquers which they manufacture and directions for using them. In the Bulletin are also listed the various appliances, such as sprayers, tanks, etc., that are needed by lacquer users. The Bulletin will be sent to those who desire it.

Owing to the consolidation of the aluminum departments of the Allyne Foundry Co., of Cleveland, Ohio, with the other aluminum foundries mentioned in these columns, and the formation of the Aluminum Castings Co., the brass department will be conducted separately and will be known as the Allyne Brass Foundry Co.

An iron and brass foundry, called The Danbury Foundry Co., has been started by D. Susnitsky at 14 Center St., Danbury, Conn. The manufacture of iron and brass castings for the trade will be carried on and the foundry will be conducted as a general jobbing one. Operations have already been commenced and castings are now being made. [illegible] is the manager.

G. Haarman & Co., of Holyoke, Mass., manufacturers of core ovens, are now occupying their new factory recently built.

The business of the Ontario Metal Novelty Co., Duchess and Ontario Sts., Toronto, Canada, has been taken over by the Gendron Mfg. Co., Ltd., of that city who will operate it as before.

The American Lead Co., recently formed and started at 3112 Penn Ave., Pittsburgh, Pa., will make block tin pipe, wire solder, ribbon tin, and art glass lead in addition to lead pipe and solder as already mentioned.

The firm of Yaling & Calhoon has been organized at Bristol, Conn., to manufacture brass and aluminum castings. The brass foundry has already been equipped and is in operation.

Additional holdings have been purchased by William H. Saart in the William H. Saart Co., of Attleboro, Mass., manufacturers of silver novelties, so that he now owns the controlling interest and a reorganization will soon be carried out.

The organization of Kelly Bros., of Attleboro, Mass., electroplaters and colorers, has been slightly changed owing to the death of George W. Kelly. J. McDonough will now have charge of the plating and coloring departments and is a man of extensive experience in this line.

The Manufacturing Equipment & Engineering Co., manufacturers of steel lockers, shop stools, washbowls and other factory equipment have moved from Winchester, Mass., to South Framingham, Mass., where the factory formerly occupied by the South Framingham Box Co., has been purchased. This purchase will give the company much needed room for manufacturing.

The Joseph Dixon Crucible Co., of Jersey City, N. J., desire to call the attention of the brass foundry trade to their hanger suitable for hanging in the foundry. This hanger is of large size and contains an artistic foundry scene in the middle, surrounded with other interesting pictures. This hanger will be sent to those interested upon application, and is already found upon the walls of many brass foundries.

The Celluloid Zapon Co., of Stamford, Conn., and general offices in New York City, are making considerable additions to their plant in Stamford. A large wing to their main building is being erected and a separate building is being built for their mixing department. About 15,000 sq. feet will then be added to their floor space. Their system of handling liquids so that they can be transferred from one department to another by compressed air is also new and novel. The new construction of the plant is of brick with concrete foundations and with particular attention paid to fire-proof construction. The increase of the business of the company has made these improvements necessary.

The Parry Auto Co., recently incorporated with a capital stock of $1,000,000 to manufacture automobiles, has taken the factory of the Standard Wheel Co., of Indianapolis, Ind.

The Chicago Art Metal Works, 69 Lake St., Chicago, Ill., manufacturers of monograms and other art metal goods, are now manufacturing leather goods in connection with their regular line.

The new addition to the Buffalo Brass & Copper Rolling Mill of Buffalo, N. Y., is now in process of construction and practically completed. This addition is 144 x 170 feet. This addition will allow the manufacture of brass and copper tubing, rods, wire and brass sheet. Heretofore nothing but sheet copper has been made.

The Ludlow Valve Co., of Troy, N. Y., manufacturers of valves and hydrants, have elected the following officers: President, James H. Caldwell; vice-president, Marcus Steine; treasurer, Max Nathan; secretary, J. W. Mack; chairman of the board of directors, John T. Christie.

The firm of Hanley, Stone & Co., of 33 Mathewson St., Providence, R. I., gold and silver refiners and sweep smelters, has been dissolved. Thomas Hanley has withdrawn from the firm and Wm. H. Stone will continue the business under the old name. Messrs. Hanley and Stone comprised the firm.

The plant of the Eastern Carolina Silver Co., at Hartsville, S. C., which has been in existence for a few years and has been engaged in the manufacture of silver plated hollow-ware, has been sold to the E. A. Eddy Machinery Co., of Providence, R. I., dealers in new and second hand machinery.

The Napier Automobile Co., of Jamaica Plain, Boston, Mass., are to commence the manufacture of air ships. This is the first automobile company in the United States to enter this line of work. The air ships, which will be of the dirigible type, will be sold at from $8,000 to $35,000, depending upon the "luxuriousness" of the cars.

A recent sale of 900 shares of stock in the Calumet & Hecla copper mining company owned by the estate of the late Quincy A. Shaw of Boston, Mass., brought over $600,000. The sale was made to Alexander Agassiz, the president of the company. At the time of his death, Mr Shaw was one of the largest stockholders and his estate still holds 4,600 shares.

Work has been started on the new plant to be erected by the Frank Mossberg Co., at Attleboro, Mass. The buildings will cost $50,000 and the main building will be 60 x 200 feet. A new nickel plating, polishing and lacquering rooms will be installed as well as a new japanning department. All polishing machines will be equipped with exhaust fans for removing the dust. Small hardware and metal novelties are manufactured by the company.

The Westerly Jewelry Mfg. & Engraving Co., has been organized in Westerly, R. I., and are now manufacturing a line of scarf pins.

The Selden Motor Vehicle Co., of Rochester, N. Y., manufacturers of automobiles, are to build a new plant in that city for the manufacture of their product. It will be located at University Ave. and Probert St.

The K. & O. Co., 366 Butler St., Brooklyn, N. Y., manufacturers of metal goods, are now branching out in the manufacture of artistic metal wares of new designs. One of their new products are jewel cases made of hard rolled brass and German-silver, instead of the usual cast metal, so as to give strength to it.

The Progressive Metal & Refining Co., has been incorporated at Milwaukee, Wis., with a capital stock of $50,000 for smelting and refining scrap metals. This company was organized about a year ago. The manufacture of red and yellow ingot brass is carried on. The office is at 610 Majestic Bldg., and the works at 57 Third St.

Personal.

J. Kent Smith, chief metallurgist of the American Vanadium Co., of Pittsburgh, Pa., has resigned his position with the company and returned to England.

It is reported that Richard W. Sears of Sears, Roebuck & Co., of Chicago, Ill., the well known mail order house, has sold out his holdings in the company and will retire at the age of forty-five worth $25,000,000.

Samuel H. Dougherty, who for many years has been in charge of the St. Louis office of the Joseph Dixon Crucible Co., has severed his connection with this company and has become associated with the Jonathan Bartley Crucible Co., of Trenton, N. J. Mr. Dougherty will act as the Western representative of the company and his headquarters will be at Mount Vernon, Ohio.

Obituary.

George W. Kelly, of the firm of Kelly Bros., Attleboro, Mass., electroplaters and colorers, was instantly killed on August 15th, in his own factory by the catching of his clothing in a revolving shaft.

Charles N. Cordier died on August 31st, at his residence in New York City at the age of sixty-three. For the past few years he acted as Eastern representative of the Ross-Tacony Crucible Co., of Philadelphia, Pa. Prior to that time he was the New York agent of the Bridgeport Brass Co., and at one time was connected in a similar capacity with Wallace & Sons, of Ansonia, Conn., long since out of business. Mr. Cordier served in the Twelfth Regiment during the Civil War.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation

Acetone, pure, 98-99%	lb.	.22
Acid, Acetic, pure, 30%	lb.	.07
Acid, Arsenious (White Arsenic)	lb.	.20
Acid, Benzoic	lb.	.55
Acid, Boracic (Boric), pure	lb.	.12
Acid, Hydrochloric, see Acid, Muriatic		
Acid, Hydrofluoric, 30%	lb.	.04
Acid, Hydrofluoric, 50%	lb.	.10
Acid, Muriatic, 20°	lb.	.02
Acid, Muriatic, C. P. 20°	lb.	.07
Acid, Nitric, 38°	lb.	.05⅝
Acid, Nitric, 40°	lb.	.05⅞
Acid, Nitric, 42°	lb.	.06¼
Acid, Nitric, C. P.	lb.	.08
Acid, Sulphuric, 66°	lb.	.01¾
Acid, Sulphuric, C. P.	lb.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	lb.	.04
Aluminum, Sulphate	lb.	.06
Aluminum, Metallic in Ingots	lb.	.21
Aqua-Fortis, see Acid, Nitric.		
Ammonia Water (Aqua-Ammonia), 20°	lb.	.04¼
Ammonia Water (Aqua-Ammonia), 26°	lb.	.06¼
Ammonia Water, C. P.	lb.	.08
Ammonium Carbonate, lump	lb.	.15
Ammonium Chloride (Sal-Ammoniac)	lb.	.12
Ammonium Hydrosulphuret	lb.	.30
Ammonium Sulphate	lb.	.07
Ammonium Sulphocyanate	lb.	.50
Amyl Acetate	gal.	1.85
Antimony	lb.	.08½
Arsenic, Metallic	lb.	.15
Arsenic, White (Acid Arsenious)	lb.	.20
Argols, White (Cream of Tartar)	lb.	.31
Asphaltum, Commercial	lb.	.05
Asphaltum, Egyptian (Bitumen)	lb.	.30
Benzine	gal.	.15
Benzol, Pure	gal.	.75
Bismuth, Metallic	lb.	1.75
Bitumen, see Asphaltum.		
Blue Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	lb.	.10
Borax Glass	lb.	.35
Cadmium, Metallic	lb.	.75
Carbon Bisulphide	lb.	.10
Calcium Carbonate (Precipitated Chalk)	lb.	.10
Chrome-Green	lb.	.50
Copper, Lake, (cask)	lb.	.13
Copper, Lake, (carload)	lb.	.13¼
Copper, Electrolytic (carload)	lb.	.13
Copper, Electrolytic (cask)	lb.	.13¼
Copper, Casting (carload)	lb.	.13
Copper, Casting (cask)	lb.	.13¼
Copper Acetate (Verdigris)	lb.	.35
Copper Carbonate, dry	lb.	.25
Copper Sulphate (Blue-Stone)	lb.	.09
Copperas, see Iron Sulphate.		
Corrosive Sublimate, see Mercury Bichloride		
Cream-Tartar, see Potassium Bitartarate		
Cryolite	lb.	.12
Cyanide, see Potassium Cyanide		
Dextrin	lb.	.15
Emery Flour	lb.	.04
Emery, F F & F F F	lb.	.03
Flint, powdered	lb.	.01
Fluor Spar	lb.	.01¼
Fusel Oil	gal.	1.75
Gold Chloride	dwt.	.60
Gum Copal	lb.	.30
Gum Gamboge	lb.	.26
Gum Mastic	lb.	.70
Gum Sandarac	lb.	.35
Gum Shellac, brown	lb.	.50
Gum Shellac, White	lb.	.60
Iron Perchloride	lb.	.25
Iron Sulphate (Copperas)	lb.	.05
Lead Acetate (Sugar of Lead)	lb.	.15
Lead, Pig	lb.	.04⅜
Lead, Red	lb.	.12
Lead, Yellow Oxide (Litharge)	lb.	.12
Liver of Sulphur, see Potassium Sulphide		
Manganese, Ferro 80%	lb.	.10
Manganese, Metallic, pure	lb.	.75
Magnesium, Metallic	lb.	1.25
Mercury Bichloride (Corrosive Sublimate)	lb.	.93
Mercury, Metallic (Quicksilver)	lb.	.57
Mercury Nitrate	lb.	1.50
Mercury Oxide, yellow	lb.	1.80
Nickel and Ammonium Sulphate (Double Salts)	lb.	.16
Nickel Carbonate, dry	lb.	.60
Nickel Chloride	lb.	.50
Nickel, Metallic	lb.	.47
Nickel Sulphate (Single Salts)	lb.	.25
Nitre (Saltpetre), see Potassium Nitrate		
Oil of Vitriol, see Acid, Sulphuric		
Paraffine	lb.	.15
Phosphorus, yellow	lb.	.40
Phosphorus, red	lb.	1.10
Pitch	lb.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	12.50
Platinum, Metallic	oz.	28.50
Potash, by Alcohol, in sticks	lb.	.50
Potash, Caustic (Potassium Hydrate)	lb.	.08
Potassium Bichromate	lb.	.14
Potassium Bitartarate (Cream of Tartar)	lb.	.31
Potassium Carbonate (Pearlash)	lb.	.10
Potassium Chlorate	lb.	.15
Potassium Cyanide	lb.	.25
Potassium Iodide	lb.	2.25
Potassium Nitrate (Nitre or Saltpetre)	lb.	.10
Potassium Permanganate	lb.	.17
Potassium, Red Prussiate	lb.	.60
Potassium, Yellow Prussiate	lb.	.24
Potassium Sulphide (Liver of Sulphur)	lb.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	lb.	.70
Pumice, Ground	lb.	.05
Quartz, Powdered	lb.	.01
Rosin, Yellow	lb.	.04
Sal-Ammoniac, see Ammonium Chloride		
Sal-Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Fine	oz.	.51½
Silver Nitrate, crystals	oz.	.50
Soda Ash	lb.	.05
Sodium Biborate, see Borax.		
Sodium Bisulphate	lb.	.15
Sodium Carbonate (Sal-Soda), crystals	lb.	.02
Sodium Hydrate (Caustic Soda)	lb.	.05
Sodium Hydrate (Caustic Soda) by Alcohol (in sticks)	lb.	.45
Sodium Hyposulphite ("Hypo")	lb.	.04
Sodium, Metallic	lb.	.90
Sodium Nitrate	lb.	.05
Sodium Phosphate	lb.	.09
Sodium Silicate (Water-Glass)	lb.	.04
Soot, Calcined	lb.	.15
Spelter, see Zinc		
Sugar of Lead, see Lead Acetate.		
Sulphur (Brimstone), in lump	lb.	.05
Tin Chloride	lb.	.40
Tin, Metallic	lb.	.30½
Turpentine, Venice	lb.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water Glass, see Sodium Silicate		
Wax, Beeswax, yellow	lb.	.45
Wax, Carnauba	lb.	.70
Whiting (Ground Chalk)	lb.	.02
Zinc Carbonate, dry	lb.	.19
Zinc Chloride	lb.	.12
Zinc, Sulphate	lb.	.06
Zinc (Spelter)	lb.	.05¼

THE

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AND

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Crucibles for Oil Furnaces.

In the early days of oil furnaces it was not customary to make any special crucible mixture for use in them. The ordinary graphite crucible used in coke or coal furnaces was sold and the user was left to his fate. As a usual rule this did not affect the crucible manufacturer to any extent as breakages, short life or scalping of the crucibles were laid to the oil furnace and not to the crucibles themselves.

Gradually crucible makers realized that to obtain satisfactory results, a crucible should be made with particular reference to its use in oil furnaces, and now every manufacturer makes a special mixture for this purpose. So much experimenting and so much thought have been given the subject that the crucibles now supplied to users of oil furnaces are the result of many years of progress on the part of the crucible manufacturer. Had it been possible, in the early days of oil furnaces, to obtain crucibles of the character of those now produced, much of the dissatisfaction then expressed would never have been heard.

As instances have recently come to our notice in which oil furnaces were censured because of the short life of crucibles in them, there seems no better time to call attention to the fact that crucibles made for coke or coal furnaces cannot be expected to give satisfactory results in oil furnaces. The conditions are quite different, and the crucible mixture must be adapted to it. One would hardly ex pect to obtain satisfactory results in a steel furnace with crucibles intended for melting brass. The time honored steel pot mixture is used for this purpose.

Crucible makers invariably supply crucibles of the special mixture for oil furnaces when they know how they are to be used, but there are many instances, no doubt, in which this information is wanting and they are not supplied. When the right mixture for oil furnaces is used, there can usually be obtained a number of heats on the crucible that will closely approach that obtained in coal or coke furnaces.

We have made these remarks for the reason that it does not seem to be generally appreciated that oil furnaces require a different crucible mixture from that used for coal or coke melting.

Method of Heating Plating Solutions.

As it is frequently necessary to heat plating solutions, either for the purpose of warming them during cold weather, or in order to plate work in them while heated, the manner of heating is important.

For small solutions, such as those of gold, the stone crock or other vessel containing them, may be heated by surrounding with hot water or a sand bath, but this is unsuited for large plating baths. There are two methods in general use for such work: One is the use of live steam by the insertion of a steam-pipe directly in the solution. While simple and easily carried out, this method is open to some objections. It is apt to introduce grease from the boiler into the solution, and also stirs up the sediment in the bottom to such an extent (particularly with nickel solutions) that it cannot be employed in many instances except when ample opportunity is had for allowing the bath to settle. On account of the ease with which this method can be employed, it is the one most generally used.

The other method of heating a plating solution is by means of a coil of pipe in the bottom of the tank, and it is by far the most satisfactory. It does not stir the solution to the extent that a direct pipe does, nor is there any danger of introducing impurities. The exhaust steam from the boiler may be used if convenient, or live steam may be allowed to pass through.

In the use of steam for heating plating solutions, care should be used in selecting pipes that will not be acted upon by the solutions and contaminate them. For an acid copper solution, for example, iron or galvanized pipe should *never* be employed. Lead pipe is necessary for it. For nickel solutions the same rule applies and lead pipe only must be used. With cyanide solutions the contrary is true as lead is acted upon to some extent and the solution will become contaminated if used. Iron pipe (*not* galvanized) should always be used for cyanide copper solutions, brass solutions, bronze solutions and those of silver. The iron will not be acted upon at all.

Oil in Yellow Brass Chips and Its Effect on the Melting Loss.

The usual method of determining the melting loss of brass chips is to take a certain quantity and melt them down in a crucible with or without flux, as may be desired. The metal is then poured into ingots and the waste or loss determined by the difference between the weight of the chips and the ingots.

It frequently happens that the oil in the chips, particularly if they are of yellow brass, affects the melting loss to such an extent that it is increased far beyond what would naturally be expected.

In a case recently noticed, a metal dealer claimed that a certain lot of yellow brass chips ought to melt with a loss of less than 6 per cent. The loss was really between 8 and 9 per cent. While the yellow brass chips did not seem oily and had been put through a centrifugal separator to remove the oil, yet a chemical analysis showed that they contained 4.11 per cent.

Taking this figure for the oil content into consideration, it will be noticed that the actual melting loss on the brass chips, after deducting the oil was between 4 and 5 per cent. This loss is excellent for this class of material.

The presence of oil in yellow brass chips, although it may not be apparent when the chips are handled, serves to increase the melt loss; and those who purchase them for melting should insist that they be as free as possible from oil. When a quantity like the preceding amount (4.11 per cent) is not particularly noticeable, it indicates that the consumer of the chips is quite apt to be overcharged unless he is on his guard.

The "Bohl" Process of Casting Brass and Other Metals in Plaster of Paris Molds.

By E. L. H. Bohl.

All who are familiar with foundry practice know that since casting was first begun there has been a ceaseless endeavor to find some method whereby metals melting at a high temperature, such as brass, bronze, silver or gold, might be cast in molds made from some mixture containing plaster of Paris so that flexible patterns could be employed for undercut work. Several patents have been granted upon such processes, but none have been so far successful. The sand method is still the cheapest for bronze, while brass castings have never yet been successfully made in plaster molds, even when pressure is applied to the molten metal. Molds for this purpose must be minutely porous and absolutely dry. The first condition is easily satisfied by using a mixture of finely sifted ashes and plaster of Paris; but the second, that of dryness, has heretofore been impossible to maintain, as the porous mold becomes saturated with moisture from the air immediately upon being removed from the drying oven.

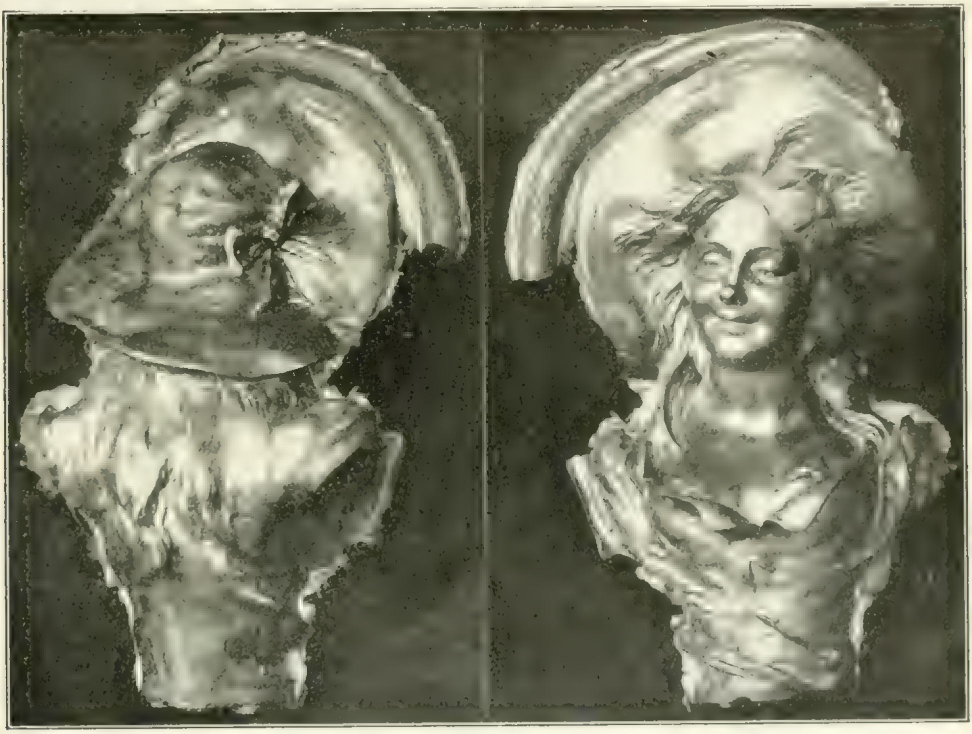

Fig. 1. Front and Back of Yellow Brass Casting Made in Plaster Mold by the Bohl Process. Mold for it Shown in Fig. 8.

For twenty years, I have experimented upon the subject, and finally came to the conclusion that if the mold, previously dried, was saturated with wax or a grease, the absorption of moisture would be avoided; and after much work, I found that a simple saturation with lard sufficed for all purposes, and with a mold made up of a mixture of equal parts of plaster of Paris and fine ashes, all that is required is to dry the mold, then paint the face over with lard and again place it in the oven to permeate, when the operation is completed. Upon this I have been granted a patent (June 15, 1909) which fully covers the ground and protects me from infringement or use.

In the use of plaster of Paris molds, fine detail is expected, otherwise it would not be used. Heretofore it has also been limited to patterns upon which there are no undercut por tions. By my process, it is possible to use all kinds of undercut designs as can be appreciated by reference to the castings shown in Figs. 1 and 2. It will be readily understood, therefore, that all classes of castings may be made.

In Fig. 2 is shown a casting of a bell, taken from an original casting made in olden times. Those who are skilled in the art of molding will readily understand that it would be impossible to cast it in the ordinary manner on account of the intricate design and impossibility to draw it from the sand. Were it to be cast in the regular way, two methods would be open: first, by use of false core work, Second, by the lost wax process. Those who understand false core molding will at once see that even with this method, the problem of successful molding is great. It has been said that this particular bell is really the *limit* of false core work, and if one is able to mold it, he is certainly a master of his trade. As far as the lost wax process is concerned, it is so difficult to melt all of the wax out of the pockets and corners, that the method can hardly be called one adapted to every kind of work. If the wax is not all removed, the molten metal strikes it and an imperfection in the casting is produced. It is usually considered that the lost wax process is unsuited for many classes of work, and for that reason, the false core method of casting undercut designs has been the one most extensively used.

The method of casting undercut work by my process is simple, and if rubber patterns are employed, they can be used over and over again so that the actual cost of casting is really no greater than for patterns with straight draft. The use of rubber patterns presents nothing new, and if made of good, soft rubber, they are equal to those made of glue. In case but one casting is to be made

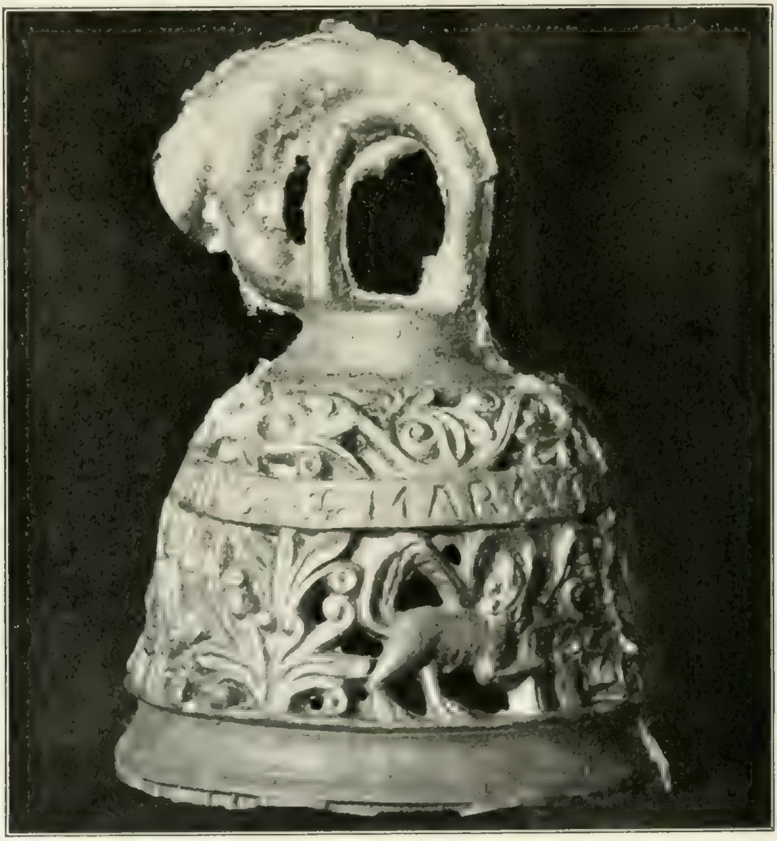

Fig. 2. Yellow Brass Bell Casting Easily Made by the Bohl Process. One of the Most Difficult Castings to Make by the the False-Core Process.

of an undercut pattern, glue can be used as will be subsequently described.

Let it be assumed that the bell shown in Fig. 2 is to be cast. The first operation is to make a wax model. This, of course, is a job for the modeler. When this has been done, a plaster cast (ordinary plaster of Paris without ashes) is taken from it. The plaster cast is shown in Fig. 3 and is used for making the glue pattern. In order to cast the glue, a wood frame is set around half of the mold or "match", which it really is, for it is used only to make the glue pattern. When the frame has been placed around it, the halves are clamped together and are ready for casting the glue.

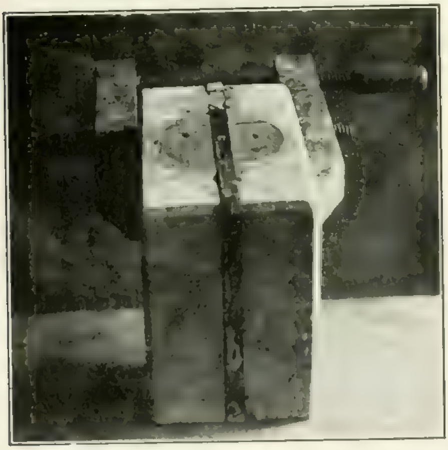

Fig. 4. Glue Pattern for Bell Cast in the Plaster Mold.

The casting of the glue in this mold is a simple operation and presents nothing new. It is a process quite generally understood and one that has been in use for many years for a variety of work other than in the molding of metals. When the glue has been cast this mold has the appearance indicated in Fig. 4

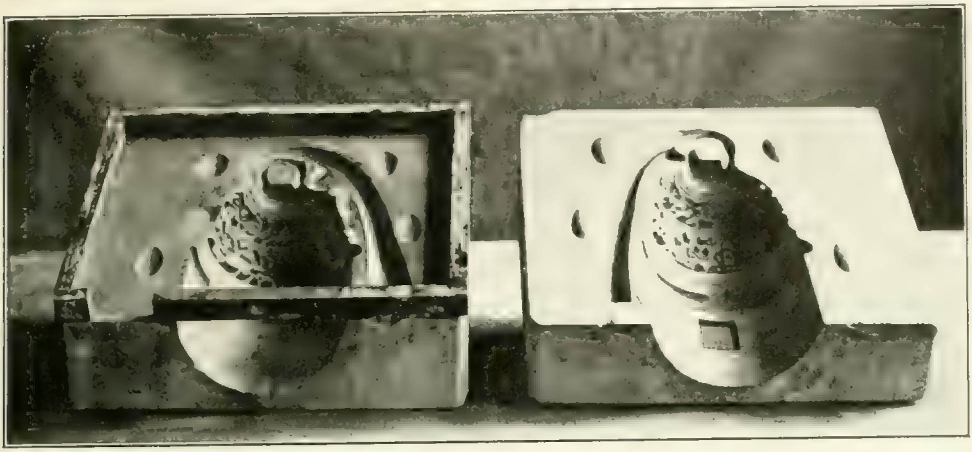

Fig. 3. Plaster Cast from Wax Model. Ready for Casting the Glue Pattern. Glue Pattern Cast in it is Shown in Fig. 5.

The object of the wood strips around the edge is to produce a back to each half of the pattern as will be afterwards understood.

The glue is allowed ample time to set and is then removed from the plaster in which it has been cast. This plaster match may be preserved for casting other glue patterns, if desired, as the glue patterns are quite flexible, and the undercut portions are not injured at all. When the glue is cold and set, it is carefully stripped from the plaster and will have the appearance shown in Fig. 5. This is known as the "glue pattern". It will be noticed that the gate and pins are cast on it so that there will be no cutting of the plaster mold made from it when completed. The first side only is shown, but the reverse side is practically the same, except in the design of the bell. The object of making the glue pattern in this manner is to have it act as the pattern and match board at the same time. When the plaster is cast on one side for the nowel, it is removed, after setting, the glue pattern turned over, and the other side used for casting the cope. In this manner, both the cope and nowel are produced.

In casting the bell, as shown in Fig. 2, a core is necessary for rendering it hollow

This is made of the same materials as the mold, and in a special mold. It is unnecessary to go into the detail of the mold for making the core as it is a simple process and no undercut portion is used. In Fig. 6 the core may be seen.

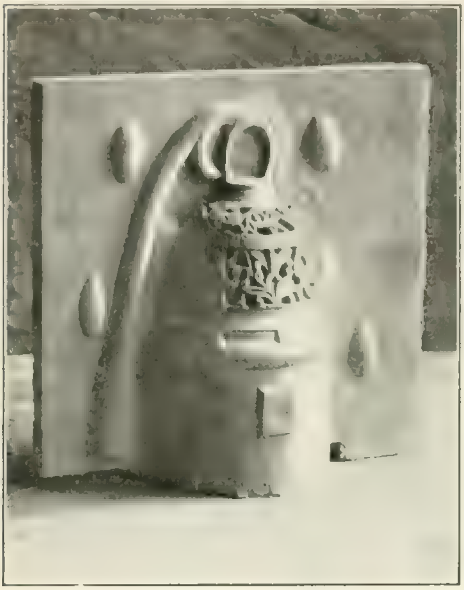

Fig. 5. The Glue Pattern as Cast and Ready for Use.

The glue patterns having been made, as shown in Fig. 5, the next operation is the production of the plaster of Paris mold in which the metal is to be cast. Equal parts of good plaster of Paris, free from lumps and finely ground, are mixed with the same bulk of coal ashes. Any kind of coal ashes will answer and they should, of course, be sifted to remove anything of a coarse nature. The plaster and ashes are mixed and then stirred into water in the manner commonly practiced in making plaster work. This portion of the process is well understood and requires no knowledge except to look out for air bubbles and to see that the plaster does not set before pouring it. These points, however, are well understood and need no special instructions.

The plaster of Paris and ashes thus mixed with the water are poured over the glue pattern. This pattern is surrounded with a box to contain the plaster and prevent it from running off. Four pieces of wood are all that are needed and are easily applied. The mass is allowed to set good and hard so that it will be sufficiently solid to resist the strain of the removal of the glue, when it is ready for taking out. The pieces of wood at the sides are taken away, and the mold is then easily pulled away from the glue. When thus completed, the mold has the appearance indicated in Fig. 6. In this illustration is shown the glue pattern, the mold, and the core for same.

In Fig. 7 the mold is shown with the core

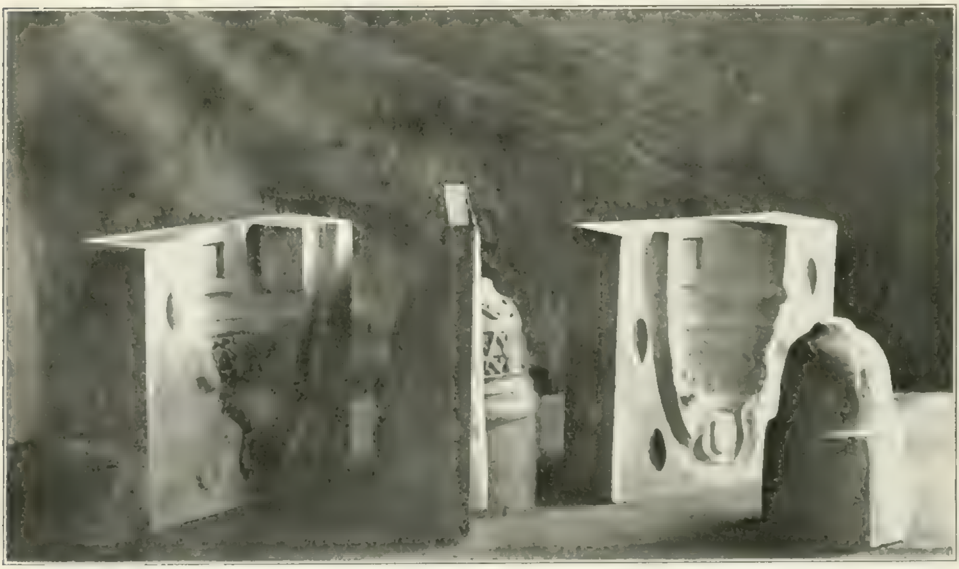

Fig. 6. Plaster Mold, Glue Pattern from Which it Was Made, and Core for Casting the Bell Shown in Fig. 2.

in place ready for placing on the cope. When this has been done the mold is ready for casting provided it has been dried. The drying is done immediately after the glue pattern has been removed from the plaster. Any convenient form of oven may be used, and the drying should be rather slow at first, after which the heat can be increased. When partially dry, which usually takes a short time, the face of the mold is painted over with common lard. It is then returned to the oven to complete the drying. During this second drying operation, the lard melts and is absorbed by the plaster so that all parts are permeated and there is produced a mold fully saturated with it. When thus dried, the mold is completed and is ready for casting the metal in it.

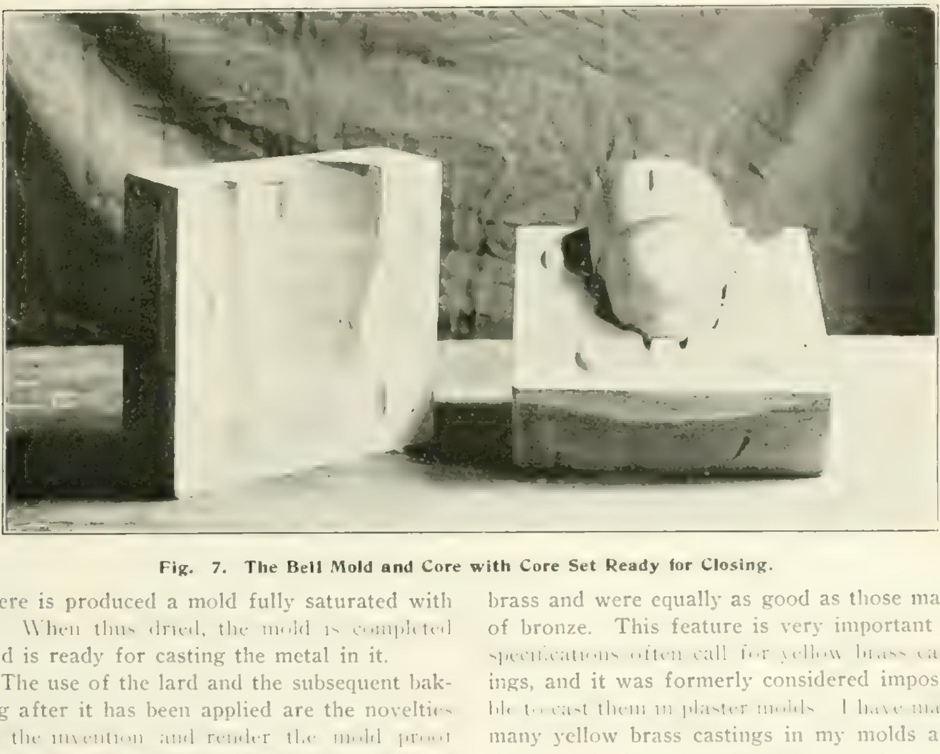

Fig. 7. The Bell Mold and Core with Core Set Ready for Closing.

The use of the lard and the subsequent baking after it has been applied are the novelties of the invention and render the mold proof against the absorption of moisture. As previously explained, the absorption of moisture by the ordinary plaster mold is the reason why metals are not successfully cast in it, and the lard prevents such an absorption. The proof against absorption is so great that after the mold has been dried, it may be allowed to remain in the air almost indefinitely without appreciably affecting it. This fact is of great value in the successful casting of metals, as it allows molds to be made ahead so that they may cast from one crucible in the usual manner without taking the extra and annoying precautions necessary for ordinary plaster molds. By applying the lard to the half-dried mold, it has ample opportunity to soak into the plaster during the final drying, so that when the operation is completed, there is produced a mold completely saturated with it.

The casting of the metal in the mold presents no particular difficulties, and is conducted in the usual manner. One of the advantages of my process of molding and casting is the fact that yellow brass, *which heretofore could not be cast in plaster molds*, is as easily cast in it as bronze or silver. The castings shown in Fig. 1 and 2 were made of yellow brass and were equally as good as those made of bronze. This feature is very important as specifications often call for yellow brass castings, and it was formerly considered impossible to cast them in plaster molds. I have made many yellow brass castings in my molds and they are all clean, free from dross and true to the pattern. The lard in the mold is the secret of the whole operation. Without it, it would be impossible to cast yellow brass in it at all.

It does not matter what kind of a casting is to be made, the process is the same. Patterns which are not undercut may be made by ordinary patterns, but as it is possible to produce the finest results by the process, and artistic castings usually have more or less undercut patterns upon them, it will be at once apparent how suitable this method is for such work. In Fig. 8 are shown the mold and core for the

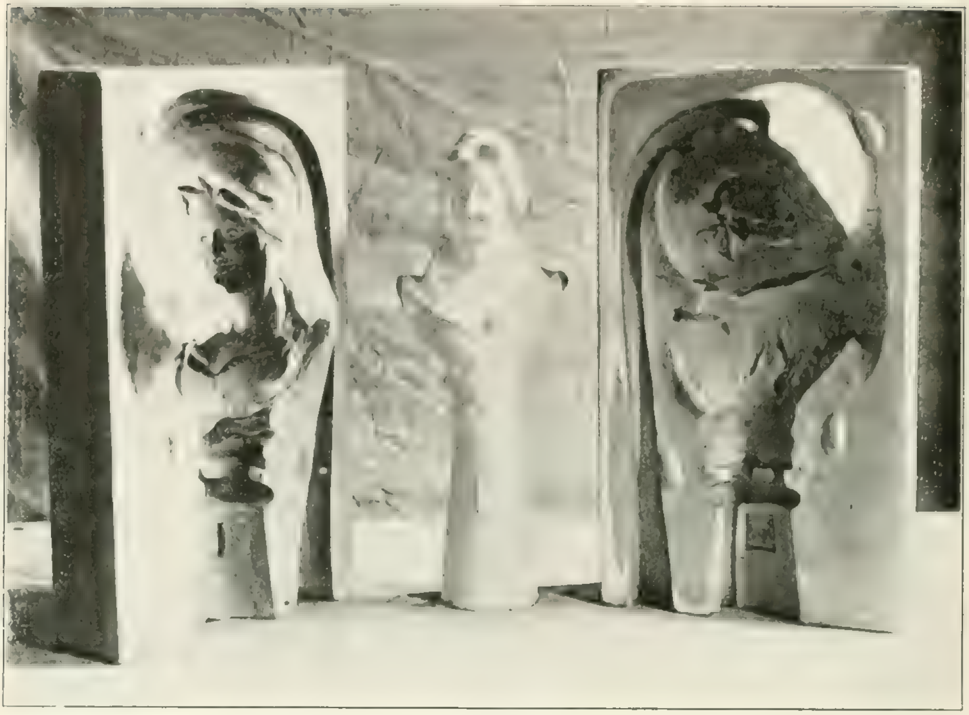

Fig. 8. Mold and Core for Casting the Bust Shown in Fig 1. The Core is Made of Same Mixture as the Mold.

casting illustrated in Fig. 1 and in which it was made.

Undercut work, of the nature of a casting shown in Fig. 1, is usually made by the so called false-core method. Large quantities of artistic metal goods made by such a process are imported into this country from France, Germany and Austria. In fact, the original casting shown in Fig. 1 was one of this kind. It was used to show how readily it could be made by my method, and how expensive it is to produce by the ordinary false-core process of casting in sand. A casting of this nature retails at about $35, and it is possible, by my process to make it for a few dollars. In order to indicate the advantage of my process over the false-core method, I have constructed a model to illustrate the manner in which it would be cast in sand.

In Fig. 9 is shown half of the mold in model that would be employed in making the casting from the model shown in Fig. 1. The various false cores are marked. In Fig. 10 the cores taken out are shown. There are about 40 cores in the complete mold so that the complicated manner in which it must be cast is

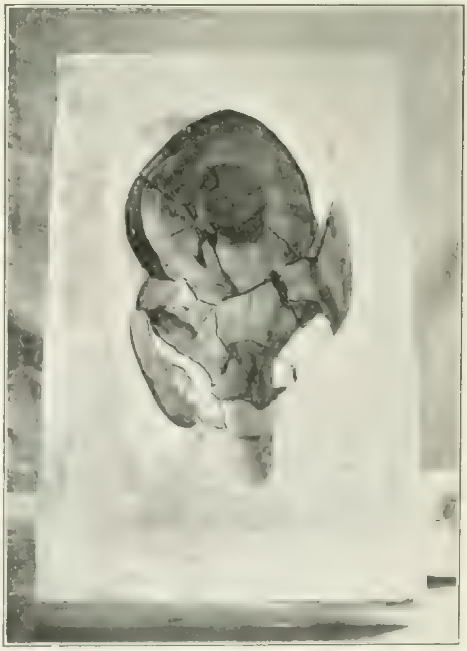

Fig. 9. Model Showing How the Casting Shown in Fig. 1 would be Made in False-Core Molding.

fully realized. In molding, it is usually considered, that *for ordinary work,* ten cents a core is the cost of molding by the false-core method. In addition to this, each core leaves a fin which must be chased off and ten cents a core is also figured as the cost of this operation. The actual cost of molding and chasing, therefore, is high when false cores are employed. In fact, the cost is so high that it is almost prohibitive for many classes of work. The advantage of my own process will, therefore, be appreciated. There are no fins left, except at the joint, and with a soft rubber pattern, it is possible to mold quite rapidly so that the process is almost a competitor to the ordinary sand molding process as used on regular work.

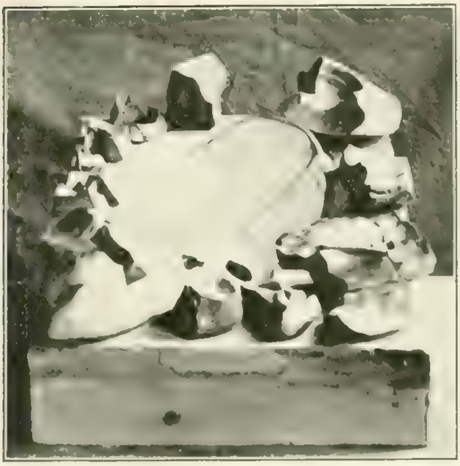

Fig. 10. Model Shown in Fig. 9 with False-Cores Removed.

The cheapness of the process, especially when the pattern is undercut, will be obvious to those familiar with the subject. Its general use will insure a marked improvement in the character of all ornamental work as any modeler may work with the utmost freedom, unhampered by any consideration as to whether or not his pattern will draw from the mold.

Oil furnaces are now extensively used in melting sterling silver as [illegible] is far less satisfactory for this purpose. The loss of silver in the ashes, when coal or coke is employed, is a serious obstacle and has been the cause of the change. Gas is also an excellent fuel [illegible], but more expensive than oil.

Temperature of Hot Plating Solutions.

While hot solutions cannot be employed in plating with all metals, there are some which produce better results when they are used. It is particularly true in the case of cyanide copper solutions, of brass and of gold. The use of hot cyanide copper solutions is becoming quite extensive as it has been found that for plating iron or steel, far better results can be obtained than when used cold.

The question often arises, when speaking of "hot plating solutions", about the temperature to be employed. This point is of much importance and the term "hot" is somewhat indefinite. Take, for example, a hot cyanide copper solution; should the temperature be actually boiling or lukewarm? This question is frequently asked.

While a cyanide copper solution heated nearly to boiling gives excellent results, it is not advisable to use such a high temperature in actual practice. The solution then rapidly evaporates, the tank (if wood) is acted upon and the lining of pitch or asphalt is melted off; and in addition, the cyanide in the solution is decomposed far more quickly than in one at a less temperature. Another bad feature of solutions excessively hot is the steam and vapor which arise from them, filling the room and injuring the workmen.

For a hot copper solution, a temperature from 120 to 150 degrees Fahrenheit is quite satisfactory and conducive to good results. It is readily kept at this amount. Some platers prefer to keep it at a temperature of not over 120 degrees. The right amount may be readily ascertained with the eye, as at 150 degrees steam begins to come from the surface readily, although at 120 degrees, a slight amount may be seen.

Brass solutions are rarely heated beyond 120 degrees as they give better results when kept at or below this point. The temperature of gold solutions varies, of course, with the desired color of the deposit.

Fig-soap, now coming into use in cleaning metals for plating, is so named from its color. It resembles the [illegible] and [illegible] ish [illegible] and is [illegible]. It is [illegible] from odor.

The Mechanical Testing of Files.

The Sheffield File Manufacturers' Association have still under consideration the question of their attitude towards the testing of files by means of a machine which was invented about two years ago, and is already being used by a considerable number of users and makers. The machine registers on a chart the number of strokes made and the time occupied by a file cutting a given length of bar, and already there is a recognized standard of what a good tool should accomplish under this test. Those filemakers who maintain a high standard of quality would welcome rather than resent a reliable means of ascertaining whether a file is made of good steel; but they state that careful experiments show that the machine cannot be relied upon to determine this, nor do they think it possible to judge the practical value of files by mechanical methods. They declare that good files have sometimes given a poorer record on the diagram of the machine than inferior files have done, and that a tool which does well in the machine may be unsatisfactory in the workshop. Before agreeing to abide by the machine test the makers in the first place want a standard test bar of specified temper to be adopted; but there are many other circumstances to be taken into consideration, including the attention which users are now paying to different forms of cuts on a file to suit varied classes of work. In fact, the whole matter so bristles with difficulties and complications that the matured opinion in Sheffield is that workshop practice supplies the only test which can be relied upon absolutely. The makers foresee the risk of a parcel of good files being condemned because a few out of the lot have failed to give the stipulated record when submitted to the machine, and naturally they do not relish the idea of staking their reputation upon what they regard as an unreliable test.

In a number of cases users of files, when placing a contract, stipulate the record which the goods must show in a mechanical test, but it seems that some of the largest users, including several Government departments and railway and engineering companies, are beginning to recognize the unfairness of rigidly applying such a test until more definite knowledge is forthcoming as to the absolute reliability of the machine records. Hence it is not being generally insisted upon for the present. The File Manufacturers' Association have made no pronouncement on the question as yet. They think that users should await the production of the clearest evidence as to the trustworthiness of the mechanical records before they accept them as setting up an absolute standard of quality, and, while admitting the value and usefulness of the machine in various directions to themselves as well as to users, they are of opinion that such clear evidence is lacking. The matter is now being dealt with by the Applied Science department of the Sheffield University, whose organisation has on so many occasions been utilised for the benefit of the Sheffield industries, and a definite pronouncement from such a source will doubtless be accepted as authoritative.—*The Ironmonger.*

Cleaning Old Soft Metal Castings for Plating.

One of the most unsatisfactory operations in the plating room is the cleaning of old antimonial-lead, britannia-metal or pewter castings preparatory to plating. The problem is far more difficult than the cleaning of other classes of metal goods as the oxide on the surface cannot be dipped or pickled off.

The only satisfactory method of cleaning such metal wares from corrosion or tarnish is by scouring with a bristle brush and wet, powdered pumice. The corroded surface must actually be ground off. Contrary to the usual belief, there is no dip or pickle that will effectually remove it.

The use of a pickle composed of equal parts of muriatic acid and water is frequently a useful adjunct on antimonial-lead goods that have become badly corroded, but it only serves to loosen the oxide and not remove it. It should only be used after the grease has been removed from the article in the regular manner.

The cleaning of badly tarnished soft metal goods, therefore, can be accomplished only by the usual scouring operation with pumice. Manufacturers who are accustomed to plate soft metal wares, usually contrive to do it as soon as possible after they have been made so as to avoid any possibility of corrosion. The longer they are allowed to remain in the air, the greater the amount of tarnish. If plated as soon as cast or made, there is usually no scouring needed.

Coppering Iron or Steel Articles before Nickeling.

By M. H. H.

The question frequently is asked: Should iron or steel be copper plated before nickel plating it? To answer it by yes or no would scarcely solve the problem as will be appreciated from the subsequent remarks. To reply intelligently so that a plater may feel that he is sure of his ground, requires a study of his own individual case. A careful study of each individual case is necessary before a decision of value can be reached.

Let cast-iron stove work be taken as the type of work to be nickel plated. Would it be of advantage to copper plate it before nickeling? The reply will be an emphatic, No! Let us understand why. Cast-iron is extremely porous, both naturally and from flaws in the casting. When metals are plated in cyanide solutions, as they must be to copper plate iron, the solution seems to penetrate the pores and flaws to a remarkable degree. Even when carefully and thoroughly rinsed, the solution will, to a certain extent, remain in them. After a while, it begins to work out, unsightly and injurious spots appear on the surface, and the phenomenon is one known as "spotting-out." It is caused, perhaps, by the fact that potash salts, such as potassium cyanide, have the property of absorbing moisture from the air and liquefying. Possibly there may be other actions, but if so it is not well understood. At any rate, the solution oozes out and produces the spots. These spots are very annoying, and difficult to overcome. They occur on copper plated cast-iron and malleable iron more than on any other material and render the plating a matter that requires careful attention.

It is not so with nickel solutions. While "spotting-out" occurs on nickel plated cast-iron goods to a certain extent, it is insignificant compared with the spotting-out which occurs on the copper plated surface, and gives far less trouble. In fact, with careful treatment, practically no difficulty is found in nickel plating cast-iron.

Now if cast-iron stove castings are copper plated before nickeling, the phenomenon of "spotting-out" is apt to make its appearance and cause trouble. It has an annoying way of appearing on the surface of the polished metal long after the goods have been in stock so that the stoves may be hundreds or thousands of miles away before the difficulty makes its appearance. It will readily be seen, therefore, that it is usually unwise to copper plate the cast-iron before nickeling. It adds to the expense, and if done, requires the most careful work in order to overcome the "spotting-out" tendency.

There are many other kinds of cast-iron work, however, upon which a coating of copper will be found advantageous. But when it is used, the "spotting-out" difficulty should ever be borne in mind. To be sure the use of the coat of nickel over the copper neutralizes, to a certain extent, the tendency to spot, but not sufficiently to obviate it. In case it is necessary to give the cast-iron a coating of copper, then by all means use a hot cyanide solution. It covers better and quite rapidly, and the deposit can be made heavier in the shortest time.

The use of the preliminary copper deposits on cast-iron previous to nickel plating will have to be left to the judgment of the plater. In case a poor quality of cast-iron is had, or that over-pickled, then it is frequently necessary to use the copper; but in the production of a nickel plate that is to remain unblemished, the employment of the nickel deposit alone is to be advocated.

As far as the preliminary copper deposit on steel goods is concerned, it may be said that while they are not usually subject to the difficulty of "spotting-out" on account of the freedom from porosity, there is another problem often encountered with them and which may become quite a serious one. It is in the plating of tempered steel goods. Springs, edge tools, instruments, and other articles made of high carbon steel and hardened and tempered may be ruined by a preliminary coppering. To be sure it is possible to copper plate such goods without any difficulty, but unless one understands the matter, they may be ruined. The cause of such a phenomenon is as follows:

When steel (or other metals as well) is plated in cyanide solutions, a certain amount of hydrogen gas is given off. The quantity depends upon the strength of the current. The stronger the current the greater the amount of gas given off. It is well known that iron has the property of absorbing hydrogen gas, or occluding it, as it is frequently called, so that the metal itself is affected. In the case of soft iron, the effect is not [illegible] appreciable; but in steel that contains enough carbon to become hardened when quenched, the hydrogen absorption frequently becomes sufficient to break the steel. It may not break in the solution, but when springs or other forms of the hardened steel are bent, fracture usually results and often without realizing the cause. The steel is usually blamed, when, in reality, it may be of the best quality and carefully and properly tempered.

It is in the case of tempered steel articles that a preliminary coating of copper previous to nickeling is not advisable, and should not be undertaken. Nickel plating should be done directly upon the steel and then no difficulty will be experienced. In an ordinary nickel solution, practically no hydrogen gas is given off and the steel is not injured.

In the case of soft steel articles, such as stampings, hardware, bicycle handle bars, etc., upon which a coating of nickel is desired that will stand to the best possible degree, many platers prefer first to flash the article in a cyanide copper solution, or even give it a good heavy copper deposit if the job will warrant it, and then nickel over it. Platers who desire to do the best job and upon which economy is not to be carried too far, prefer to give the articles a preliminary copper deposit. Cheap work, of course, will not stand two operations and is nickeled direct.

In the use of a preliminary copper deposit on steel goods previous to nickeling, it is often said that it allows imperfect cleaning to take place. To nickel direct upon steel requires a chemically clean surface; but when a cyanide copper deposit is given it previously, particularly if a hot solution is used, it acts as an electric cleaner and serves to clean the surface from grease and oil. Nickel solutions have no cleansing power, and work must be very thoroughly cleaned before entering them.

Perhaps the advantage of a preliminary coating of copper on steel goods before nickel plating them, is beneficial more for its cleaning power than for the furnishing of a coating of metal of high conductivity. It is probable that this is the principal feature as it is possible to obtain a good job of nickeling on steel goods without it.

In the use of a cyanide copper solution for giving the preliminary copper deposit on the steel goods, it is always advisable to use a hot cyanide copper solution. When it is employed, the steel is quickly covered and all oxidation, which so seriously affects the adherence of a deposit, is obviated. It is this feature which is one of the advantages in the use of a cyanide copper deposit before nickeling. Nickel deposits rather slowly, and while an article is covering, particularly if it has deep pockets in it, there is an opportunity for oxidation in a nickel plating solution when the steel work is plated direct. By the use of the preliminary hot, cyanide copper solution, the copper deposits so rapidly upon the surface that there is little if any opportunity for oxidation or corrosion. Cyanide solutions do not act upon steel, while a nickel solution does to some extent. Nickel solutions that contain considerable free sulphuric acid, as they often do, are quite apt to attack the surface of steel goods, when they remain in the bath for some time before the nickel deposit spreads over it.

It will be seen, therefore, that the preliminary electroplating of iron and steel goods before nickeling is a matter that will have to be adapted to each individual case. For cast-iron and tempered steel goods, it should be used with an understanding of the use to which they are to be put. With soft steel goods, particularly those that have been machined and are covered with mineral oils or greases, the use of the hot, cyanide copper solution before nickel plating is usually conducive to the best results and is advisable.

Protecting Polished Steel Work from Rust.

Polished steel work may easily be protected from rust by the application of the following compound:

Lard	6 parts
Rosin	1 part

The two ingredients are melted together and stirred until cold. The rosin prevents the mass from becoming rancid and also acts as an air tight film. If rubbed upon a polished steel surface, even very thinly, it effectually preserves and protects the polish. It is easily removed by gasoline or kerosene.

The only method of hardening copper, brass, or German-silver is by means of working. Rolling, drawing, hammering, or other operations which serve to compress the metal, harden it.

Coke vs. Oil for Brass Melting.

By T. P. Gourley.*

The question frequently arises: which is the more economical way of melting brass, in the oil furnace or with coke? There have been a great many changes in the form of furnaces for melting, particularly those in which oil is used and of which there are now a large number on the market with the claim of numerous advantages. The writer has tested and operated nearly all the oil furnaces now made, and has found that the same results cannot be obtained in the oil furnace as in those employing coal or coke, as far as the loss in melting, change in composition and fuel cost are concerned.

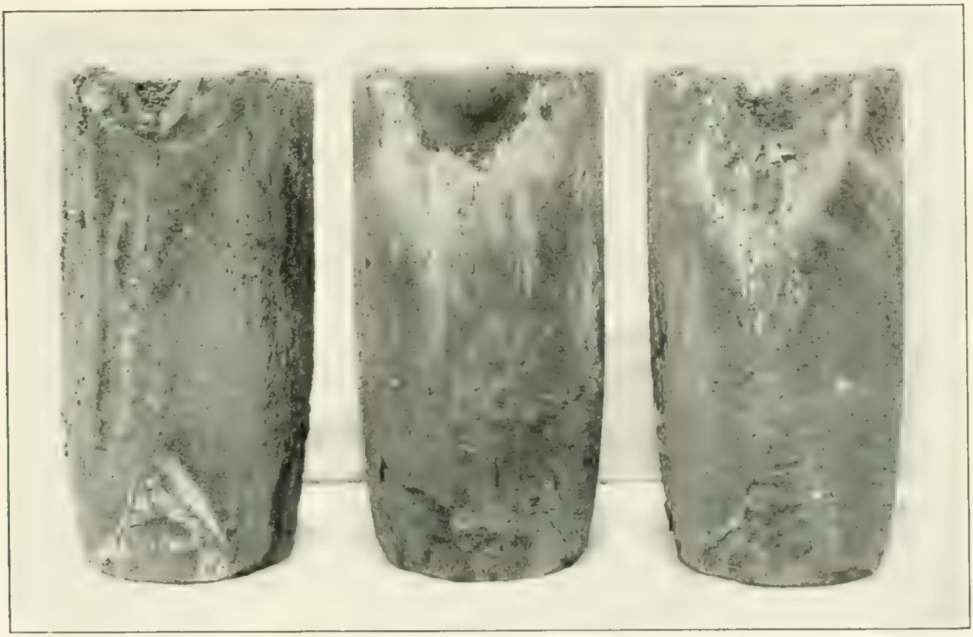

Fig. 1. Graphite Crucibles Front View Showing Effect of Oil Flame in an Oil Furnace.

The best fuels for melting are charcoal or coke, the former being given the preference when the best results are desired, but it is impossible to use it in general practice on account of its prohibitive cost. When coke is used, it should be dense, hard and bright.

It is almost impossible to operate an oil furnace with a reducing flame, on account of the excessive amount of air that must necessarily be forced into the furnace to increase the rapidity of melting. To obtain a reducing flame, it is necessary to have the right proportions of air and oil, as the oil should be sufficient to burn up the amount of oxygen that is forced into the furnace. This is impossible as the oil and air pressure are continually varying and the valves cannot be regulated to get the right proportions. Therefore, too much or too little air and oil are allowed into the furnace. The oxygen of the air, when combined with the carbon of the fuel creates combustion. The nitrogen in the air does not aid combustion, and it is an inert gas that dilutes the oxygen and carries off some of the heat. It requires 2 atoms of oxygen to 1 atom of carbon to produce complete combustion. When the hot carbon combines with the oxygen of the blast entering the furnace, the result is perfect combustion, provided the above proportions be steadily maintained, but this is impracticable in an oil furnace. Were it possible to obtain these results in an oil furnace, as good castings could be produced in them, of course, as in a coke furnace.

The cost of melting in an oil furnace under expert supervision including the cost of fuel, crucible, lining and power is about 18 cents per 100 lbs. of brass. This figure, however, does not include labor or metal loss. In coke, [illegible] ing furnaces, recently placed on the market, and when the melting is done under the preceding conditions, the cost is about 14 cents per 100 lbs. of brass. This is due to the lower cost of fuel and increased life of crucibles. These figures are taken from oil tilting and coke tilting furnaces.

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*With J. B. Wise, Watertown, N. Y.

Another objection to the oil furnace is that oil is more injurious to the crucible than either coal or coke. The reason is that oil fuel produces a much fiercer flame. With coal or coke the flame is more gentle. The oil is obliged to do its work under a pressure of from ¾ to 5 lbs. per sq. in. and this pressure, even were the air alone used, would in time wear away the crucible.

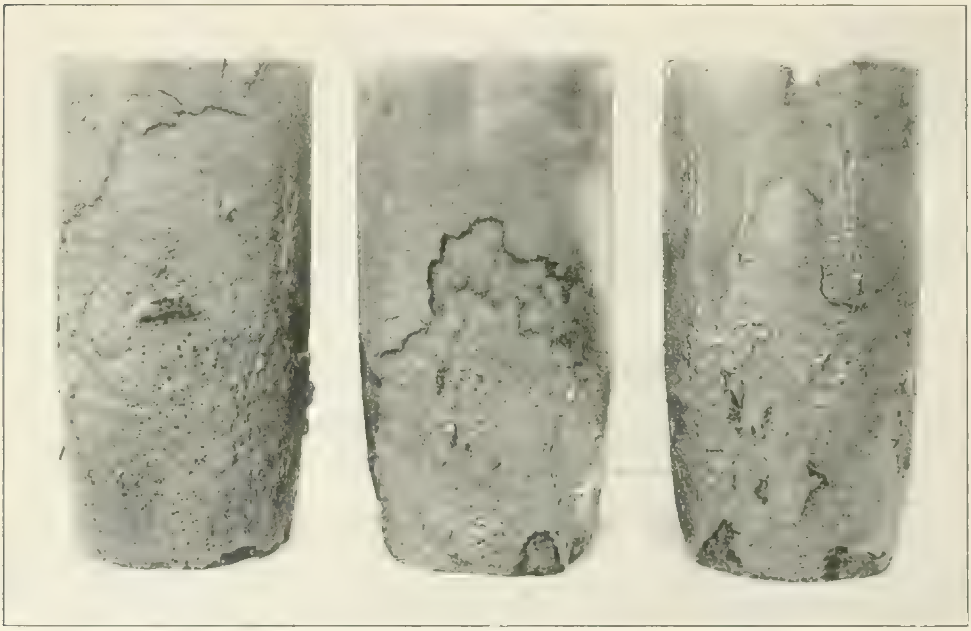


Fig. 2. Graphite Crucibles (Back View) Showing Effect of Oil Flame in an Oil Furnace.

When ignition takes place in an oil flame, the oil ceases to be oil. It has vaporized, or, in other words, has changed to a gas. This gas forms almost instantly after leaving the injecting nozzle; and it is at this point that skill is needed as well as careful manipulation. The chief thing is to produce a perfect combustion, and to do this, the operator must understand the proper proportions of air and oil to get the right mixture.

The most serious effect in the use of oil is at the start with new crucibles. If too much oil is allowed to enter the furnace with too little air to form perfect combustion, the surplus gas will be forced as gas against the walls of the crucible, and its effect upon it will be very detrimental. Hot gases of this kind are moist and this produces what are known as alligator cracks, and layers will peel from the crucible to the depth this moisture has penetrated. In fact, the effect of this hot gas permeates the entire wall with the result of deadening it. If too much air is allowed to enter the furnace with too little oil, it brings about an oxidizing condition which extracts the carbon from the crucible wall leaving a porous, clay structure, and while the wall may retain its original thickness, the graphite, its principal and vital ingredient, having been taken away, the crucible is ready to crack, its vitality has disappeared, and it may be compared to timber from a tree where the sap has been extracted before cutting. The wood looks the same, works the same under the tool, but the life is gone and its strength impaired.

Another cause of the shortness of the life of crucibles is the improper fit and careless management of the tongs. This has been proved beyond a doubt by the fact that, in a tilting furnace it is not unusual to obtain from 50 to 60 heats from a No. 150 crucible as against 10 or 15 heats in a pit furnace where it is necessary to handle the crucible with tongs. As the melter usually fears that the crucible will slip from the tongs while he lifts, he, therefore, takes a good, strong hold on it after driving down the ring on them with a bar. This is a matter of great importance, as the tilting furnace reduces the cost of crucibles. A very important factor in melting.

Use of Perchlorate Solutions for Electroplating.

Successful electroplating has heretofore been limited to a few solutions, and attempts to displace them for others have resulted in failure. The cyanide solutions are the ones most extensively employed, and so far attempts to substitute other compounds from them have met with failure. Frank C. Mathers of Bloomington, Ill., has recently patented the use of perchlorate solutions of metals for electroplating baths (U. S. Patent 931,944, Aug. 24, 1909) and which, it is claimed, give good results.

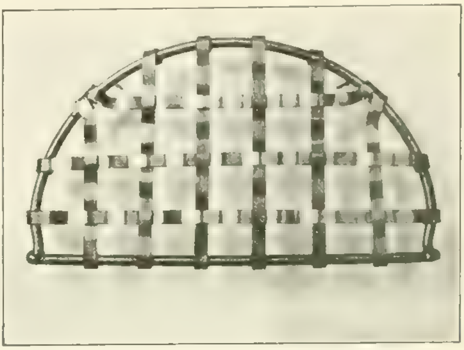
The inventor states that perchloric acid is neither reduced nor oxidized by the electric current so that it forms the ideal electroplating substance. The perchlorates of the metals are also very soluble in water. Good deposits are obtained when they are used in plating. As an electroplating solution, the use of from 5 to 10 per cent of the metallic perchlorate is recommended with from 2 to 5 per cent of free perchloric acid. This solution is suggested in case copper, silver, lead or gold are to be used. When zinc or cadmium is employed, less free acid may be used. It has also been found that the addition of such substances as white arsenic, stannous chloride, carbon bisulphide, chloroform, etc., act beneficially in producing bright and smooth deposits. From 0.1 to 0.4 per cent of any of these material are recommended.

The use of a current density of from 20 to 30 amperes per sq. foot is recommended with the solutions containing 10 per cent of the metallic perchlorate and 5 per cent of the free perchloric acid. The electroplating is carried out as usual.

The addition of cadmium to soft solder composed of tin and lead, lowers its melting point and increases its strength.

The "Railroad-Green" Finish for Brass.

The "railroad-green" finish is so called because of its use in finishing the interior brass work of railroad coaches, such as lamps, racks and other brass fittings. At one time it was quite extensively employed and even now many railroads use it. It is an attractive and modest finish for many classes of work. Its dark color renders it dignified, and as it requires no current for its production, it is easily applied.



Showing Application of the Green Finish.

While this finish has been in use for many years, it is not generally known. The discoverer seems to be unknown, and the first mention of it was in Spon's Workshop Receipts published in the early 70's. It is carried out in the following manner.

The work to be colored, either of sheet or cast brass, is cleaned and dipped if possible. Sand-blasting is also used for some classes of work, and gives an excellent matt effect when the green finish is put on. It is essential that the brass surface shall be as clean as for plating. If not, the color is not uniform, and does not adhere. When thus prepared, immerse in the following solution:

Water	1 gallon
Hyposulphite of Soda	8 oz.
Nitrate of Iron	8 oz.

The water is first heated to boiling and then the nitrate of iron dissolved in it. The hyposulphite of soda is next dissolved and the solution is ready for use. It is used as hot as possible and as a dip. No current is required. It will not remain clear, but this does not matter as the surface of the brass is not affected by the sediment or precipitate in it.

Do not immerse the article to be colored in the solution until it is sufficiently hot or it will not color evenly. When the right temperature has been obtained, immerse the article in the solution and keep it moving. The color will then gradually appear. At first various shades of yellow and green will be seen, until finally the whole surface becomes uniformly coated with a dark, green color. The article is then immediately rinsed in cold water, then in hot water and dried in sawdust. After this it is scratch-brushed with a soft, brass scratch brush to bring out an even, uniform lustre. A coat of lacquer is then applied.

The use of the nitrate of iron is taken from the original formula and is the iron compound generally employed. It has been found, however, that the perchloride of iron may be substituted with equally as good results.

In case the operator desires to make the nitrate of iron, for the preceding quantity of solution, take 4 oz. of iron chips or filings and place in a porcelain dish. Then add 2 quarts of water to them. The chips must be free from grease, and iron or soft steel is preferable to cast-iron. Then add nitric acid, little by little, until no more is required. If all the acid is added at once, the action will be so violent as to cause the solution to boil over. When the operation has been properly conducted, there will be a small quantity of chips left in the bottom undissolved. The object is to use up all the acid and have no excess. In other words, not quite enough acid should be used to dissolve the iron. In place of the chips, wire, small nails or any other convenient form may be used but they dissolve more slowly.

When nearly all of the iron has been dissolved, and a small quantity left in the bottom of the dish, pour off the clear solution from the remaining iron, add enough water to make a gallon, heat to boiling and add the hyposulphite of soda. The solution is then ready for use. In making the nitrate of iron, the essential feature is to avoid using too much nitric acid. By leaving a small quantity of iron undissolved, this will be avoided and a neutral solution obtained. In case the operator can obtain nitrate of iron, it is preferable to purchase it.

The green color obtained by the solution adheres tenaciously and is suitable for many uses. It should be lacquered, however, in order to prevent the formation of iridescence on the surface when exposed to the air. The lacquering must take place soon after scratch-brushing in order to prevent the formation of the iridescence.

Mowry's Method of Galvanizing Small Metal Goods.

A unique process for galvanizing small metal goods, such as nails, screws, bolts, washers, rivets, etc., has been devised and patented by Edward S. Mowry of Wilcox, Crittenden & Co., of Middletown, Conn., the well known manufacturers of ship and boat hardware and general galvanizers.

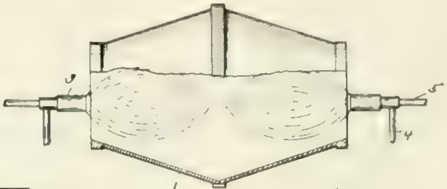


Fig. 1.

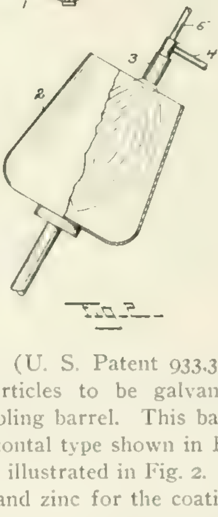


Fig. 2.

In this patent (U. S. Patent 933,324, Sept. 7, 1909), the articles to be galvanized are placed in a tumbling barrel. This barrel may either be a horizontal type shown in Fig. 1, or the oblique form illustrated in Fig. 2. A quantity of the flux and zinc for the coating metal are placed in the barrel and heat applied by the oil or gas burners 3 at the ends. The barrel is constantly rotated so that the zinc melts, attaches itself to the articles to be galvanized, and within a short time the surface is completely covered and the barrel is ready for dumping.

The use of the burners in this manner in a tumbling barrel allows the minimum quantity of zinc to be used, and thus reduces the amount of dross formed. It also facilitates the galvanizing of small articles. The process is equally as applicable to the tinning of iron or steel goods as it is to galvanizing them.

The "Blevney" Two-Belt System of Grinding and Polishing.

One of the most interesting and valuable machines for grinding, polishing and finishing metals of all kinds that has appeared on the market for some time is that manufactured by John C. Blevney, 216 High St., Newark, N. J. While these machines have been upon the market about a year, they have not been extensively known and their value is now being fully realized. They are herewith illustrated.

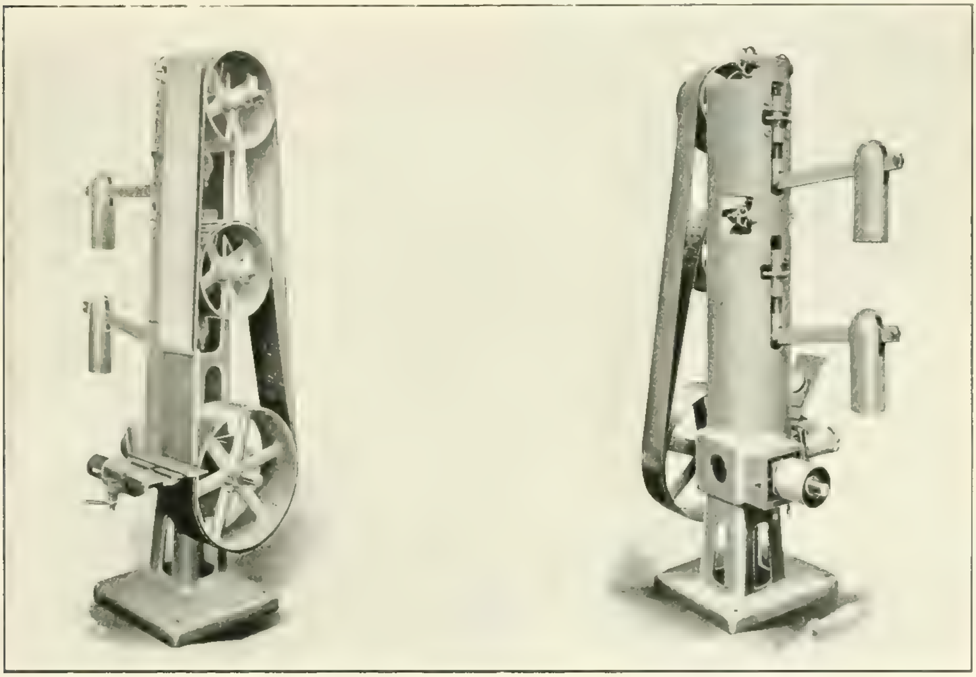


Fig. 1. Front and Back View of the "Blevney" Two-Belt System Grinding and Polishing Machine.

The machines are made in two forms: Type A and B. The two types are of similar construction and are operated upon the same principle, but are adapted for different classes of work.

The Type A machine is shown in Figs. 1 and 2. It is intended for grinding, polishing, and finishing of all kinds of goods. It may be adapted to flat, round or square work and by means of suitable rests, easily attached, such articles may be easily ground and polished with accuracy and rapidity.

The Type A machine consists of an upright stand to which a driving pulley is attached. This may be seen at the lower portion of the machine. At the other end of the shaft to which this driving pulley is attached is a larger one and over which two belts run. The outside belt is a simple strip of emery cloth (or other desired abrasive) and the ends are joined so as to make it endless. Underneath is a leather belt, either perforated or grooved as will afterwards be explained. The idler pulleys at the top of the machine over which these belts run, are supplied with counterweights so that the belts are always tight and adjust themselves automatically. The slack of these belts may be taken up or controlled by a hand well shown on the inside of the pillar.

The principal feature of the machine is the use of two belts. As previously mentioned, the outside belt is made of emery cloth. The inside belt is made of ordinary leather belting. For ferrous metals it is grooved as may be seen in the front view of Fig. 1. For other metals, the belt is perforated. This is shown in the back view of Fig. 1. The grooving or perforating of the leather belt, serves to cool the belt, give a clearance, produce straight ground, and straight lined surfaces, and allows the least amount of grinding material to be employed.

Owing to the fact that the two belts lap, one travels slightly faster than the other, and the tendency of the emery belt to wrinkle is thus overcome. There is always an air cushion between the two belts owing to the travel being off set and this serves to cool the belt and give a cushioned surface upon which the work can be ground. The speed of the driving pulley is about 1500 revolutions per minute and the grinding speed of the emery belt, 7000 feet per minute. Rapid grinding can then be obtained from it. Castings, forgings, tubing, flat pieces, and all varieties of work in all kinds of metals can readily be ground and polished on it. In Fig. 2, the operation of polishing the bottom of a flat iron is shown. By means of suitable rests, work may be polished as rapidly as it can be handled.

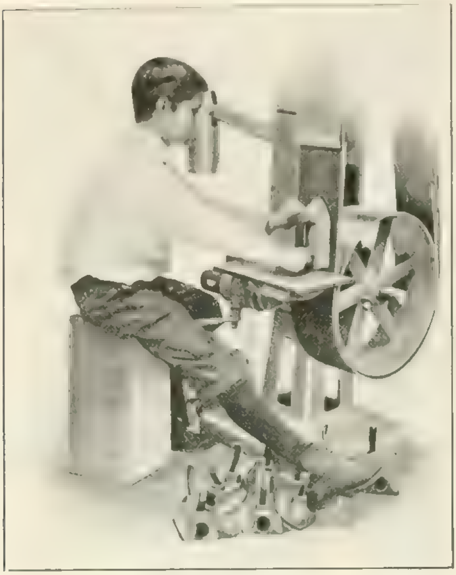


Fig. 2 Manner of Polishing with the Upright Machine,

The Type B machine, shown in Fig. 3, is intended for the automatic polishing or grind- of flat pieces such as washers. The belt with the grooves in it is used for feeding the pieces to the grinding or polishing belts and then dumping them after they have been polished. The pieces are polished on both sides at the same time. It will be noticed in the illustration that the feeding belt is supplied with pockets to receive the washers or other flat pieces. As rapidly as the operator can feed this belt, the washers are ground on both sides. Small washers can be ground or polished at the rate of 4000 per hour, while larger sizes take a proportionately longer time.

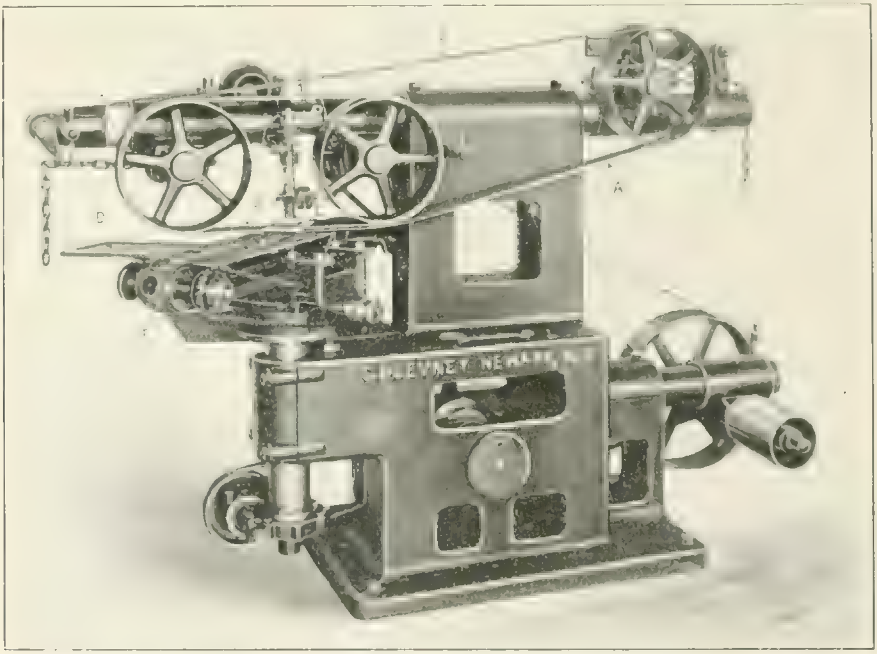


Fig. 3. The "Blevney" Machine for Polishing Small, Flat Pieces Automatically.

A valuable feature of these machines is the fact that the grinding or polishing belt is simply a piece of emery cloth which is easily obtainable and inexpensive. For the rapid grinding and polishing of all kinds of shapes, either of soft brass or of the hardest steel, the machines are capable of producing rapid and cheap results, and form a marked advance in grinding and polishing appliances.

Two New Methods of Making Table Cutlery Handles.

Two new methods of making table cutlery handles have recently been patented and are of interest. In a patent (U. S. Patent 928,515, July .0, 1909) issued to William B. Hatfield of Sheffield, England an aluminum tube is forced over the tang of a steel knife blade and then one of German-silver forced over the aluminum tube. The handle thus produced is swaged down so as to flatten it and produce some fancy design when it is completed. In Plate 1, a is the soft aluminum tube ready for insertion on the tang b. The German-silver sleeve is indicated by c.

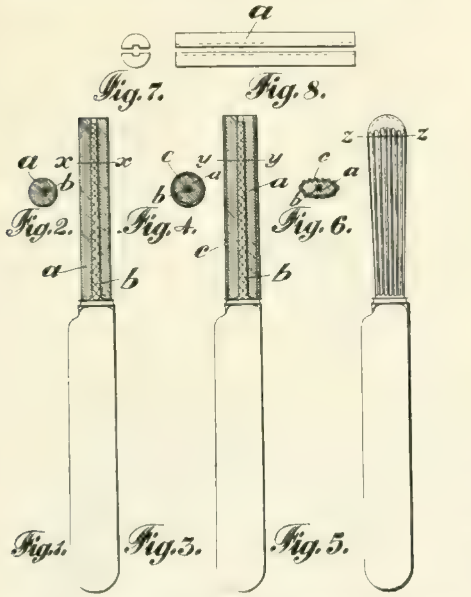


Plate 1. Hatfield's Method of Making Aluminum Knife Handles.

In a patent (U. S. Patent 931,471, Aug. 17, 1909) issued to Charles F. Peck of the C. I. Yale Mfg. Co. of Yalesville, Conn., the following method of making steel blade knives is claimed. Referring to Plate 2, the handle blank 1 is cut from a bar of steel, German-silver or other desired metal and is cut so as to provide a slot 3 with the stop shoulder 4. The blade of the knife is made of sheet steel with a tang 10 made to fit the slot 3. The tang is then placed in the slot, a rivet applied and the whole forced together under a drop press when the completed knife is produced. It may then be plated if desired. The advantage of this process is stated by the inventor to be in the fact that no hot forging is necessary. The blade is made from steel sheet and the handle from a bar so that when assembled the completed knife requires very little grinding, while in the regular manner of making the knife from a rod by hot forging, a large amount of grinding is necessary to finish it.

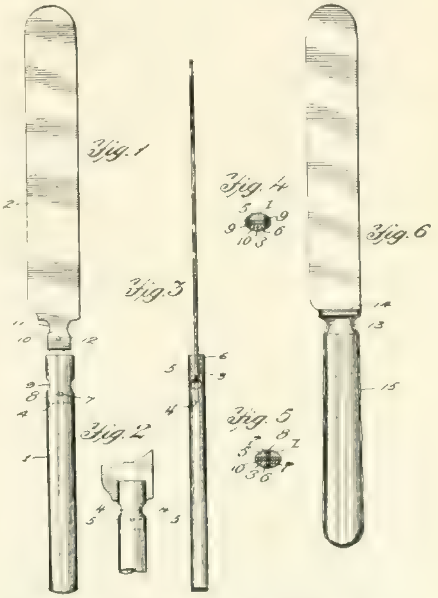
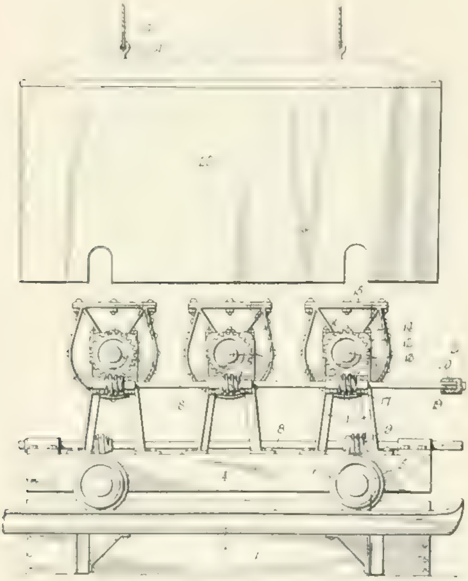


Plate 2. Peck's Method of Fastening German-Silver Handles to Knives.

As far as known, no manufacturer now copper plates his steel knives or forks previous to silvering. By the use of two "strikes", previous to the introduction in the regular silver plating bath, it has been found possible to obtain as adherent silver deposits as were previously obtained when the steel was first coppered before silver plating.

A New Form of "Sherardizing" Apparatus for Small Metal Goods.

A new form of "Sherardizing" apparatus for use in coating small metal goods has been invented by Albert J. Schroeder of Cleveland, Ohio, (U. S. Patent 933,725, Sept. 7, 1909). "Sherardizing" as is well known, is another name for galvanizing, except it is produced by a different process from that followed in dipping iron or steel articles in molten zinc. In the "Sherardizing" process, the articles to be galvanized are tumbled in a tumbling barrel with zinc dust and heated to a temperature slightly below the melting point of zinc. The barrel, during the tumbling is filled with coal-gas in order to maintain a reducing atmosphere.



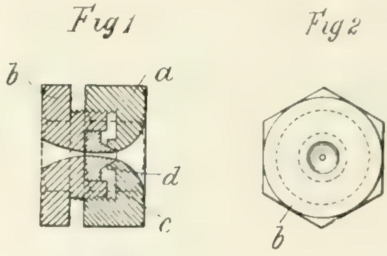
Schroeder's "Sherardizing" Apparatus.

In this invention, the articles to be "Sherardized" are placed in the tumbling barrels 14 with the necessary quantity of zinc dust. The barrels are fitted with covers 15 that can be bolted down tight. The barrels are fastened to a frame or trunnions 13 so that they may be tilted when the "Sherardizing" operation is completed. This frame is mounted on rollers so that the battery of tumbling barrels may be easily pushed into the muffle furnace for heating. A cover 22 is provided for covering the barrels and preventing the escape of the zinc dust when they are dumped at the end of the operation. The barrels are dumped by means of worm wheels and gears 5 and 6.

The object of this device is to render it easy to insert the barrels in the muffle, dump them, and also to prevent the escape of zinc dust when they are dumped.

An Adjustable Wire Die.

A novel form of adjustable die for drawing wire has been patented by John Stratton and Ernest Alexander Claremont of Manchester, England (U. S. Patent 931,971, Aug. 24, 1909). The die is herewith illustrated. It consists of two parts *a* and *b*. The portion *b* is constructed so that it screws into *a* and bears directly against the die or seat *d*.



Manner of Making the Die.

It is well known that a wire die wears continuously so that the hole gradually becomes larger. In this invention, by screwing up the plug portion *b*, either when the wire is passing, or when it is not, the orifice through which the wire passes is contracted. In this manner it is possible to decrease the diameter of the hole so that the wear is offset. In ordinary practice it is customary to decrease the diameter of the hole in a wire die by hammering around it, and then reaming it out to the desired size.

Monel-metal is a so-called "natural" alloy. It consists of nickel, copper and iron. These metals occur in the ore and they are reduced together with no attempt made to separate them. Hence its cheapness as the expense of pure nickel is mainly in its purification.

Some Tests on Vanadium-Bronze.

An extensive series of tests on vanadium-bronze made by the Victor Metals Co. of East Braintree, Mass., has been made by G. L. Norris of the Detroit Copper & Brass Rolling Mills, Detroit, Mich. The tests were made upon metal supplied by the Victor Metals Co. Plates and rods were rolled and tested.

The ingot for the plate rolling test was 8 x 1 x 24 inches. It was heated to about 700 degrees C. and then rolled down to a plate 12 inches wide and ⅜ of an inch thick. The plate rolled well and was cut in half and one piece rolled cold down to ¼ in. in thickness.

For making the wire, a billet 4 inches in diameter and 24 inches long was heated to about 700 degrees C. and rolled down to a ⅝ in. rod. This rod was then drawn cold to ⅜ in. Owing to the softness of the bronze while hot, it was hard to handle and turned upon itself several times. It was, therefore, considered that cold working is preferable. In drawing the rod into wire, the metal proved to be very hard and had to be worked down by smaller reductions than usual. Pieces were cut off from the different sizes for test, and then the remainder was remelted and cast into a wire rod ingot 1¼ inches in diameter for drawing cold direct.

Elongation in 2 in. ..	33%	.......7%
Reduction of Area ..	27.5%	.....12.6%

The ⅝ in. rod in the preceding test was the hot rolled material, while the ½ in. rod was cold drawn from it.

The following tests were made upon the annealed rods and wire:

	9/10 Rod.	½ Rod.
Elastic Limit per sq. in.	37,730 lbs.	36,100 lbs.
Ultimate Str. sq. in. ...	73,640 lbs.	70,690 lbs.
Elongation in 2 in.	22%	.......20%
Reduction of Area ..	17.8%	........20%

The following tests were made upon the recast rod and cold drawn:

	¾ Rod.	⅝ Rod.
Elastic Limit per sq. in.	64,650 lbs.	80,070 lbs.
Ultimate Str. sq. in. ...	95,960 lbs.	92,090 lbs.
Elongation in 2 in.	5.5%	.....11.5%
Reduction of Area ..	10.65%	......29.3%

Portions of the preceding rods were annealed and then tested with the following results:

	¾ Rod.	⅝ Rod.
Elastic Limit, pr sq. in.	25,960 lbs.	27,600 lbs.
Ultimate Str. sq. in.	60,700 lbs.	60,800 lbs.
Elongation in 2 in.	47%	......51.5%
Reduction of Area ..	40.8%	.......44.8%

These rods were annealed at 600° C.

Some supplementary tests were made at a later date and the following results obtained on ⅜ in. wire: Elastic limit, 83,180 lbs. per sq. in., Ultimate Strength, per sq. in. 101,000 lbs. Elongation in 2 in. 10%. Reduction of Area, 31.8%.

Sand Casting of Vanadium-Bronze Twisted Cold in a Vise.

The tests of the rods and wire, both from the original and re-cast ingots, show very high elastic limits and tensile strengths. Fully 60 per cent more was obtained than can be produced from ordinary Muntz-metal. The average tensile strength of Muntz-metal is about 58,000 lbs. per sq. in. while the average of the tests of rods and wire drawn from the original ingot of the vanadium bronze was 91,940 lbs. per sq. in.

	Rod	Rod
Elastic Limit per sq. in.	37,080 lbs.	83,900 lbs.
Ultimate Str. sq. in. ...	75,080 lbs.	96,000 lbs.

Tests of the rolled plate gave the following results:

	Hot Rolled	Cold Rolled
Elastic Limit, per sq. in.	35,500lbs.	76,940 lbs.
Ultimate Str. sq. in. ...	75,500 lbs.	95,370 lbs.
Elongation in 2 in. ...	24%	10%
Reduction of Area ..	22%	14%

The hardness of the plates, as found by the Brinell test, was with a load of 3000 kilos, [illegible] for the hot rolled plate, and 185 for the cold rolled one. The hardness of the cold rolled plate, therefore, is about the same as boiler plate.

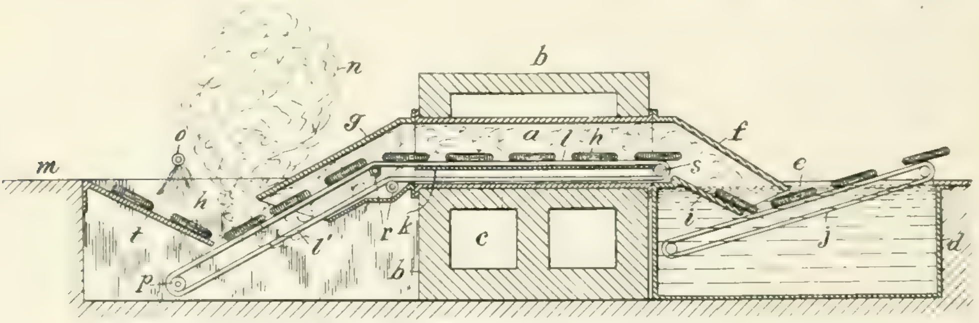
Tests of sand castings made at the Watertown Arsenal on tests bars 1 inch in diameter, gave the following results. Fourteen bars were tested.

	Lowest	Highest
Elastic Limit, per sq. in.	16,400 lbs.	32,500 lbs.
Ultimate Str. sq. in. ...	51,100 lbs.	71,000 lbs.
Elongation in 2 in.	10%	67%
Reduction of Area ..	17.2%	49.6%

The toughness of vanadium bronze is illustrated by the specimen herewith shown. This was a sand casting twisted cold in a vise.

An Improved Annealing Furnace for Producing Bright Copper Wire.

An improvement in annealing furnaces for producing bright soft copper wire has been patented by Chauncey C. Baldwin of the Standard Underground Cable Co., of Perth Amboy, N. J. (U. S. Patent 932,945, Aug. 31, 1909). The improved furnace is herewith illustrated.



Baldwin's Annealing Furnace for the Bright Annealing of Copper Wire etc.

The improvement consists in the use of the steam generated at the outlet end of the furnace for filling the muffle with a non-oxidizing atmosphere, thus dispensing with the use of steam from a boiler. The result is one of economy.

The furnace used is shown by b and the coils of copper wire are annealed in the muffle a in which there is a constant atmosphere of steam to produce the non-oxidizing or reducing action and prevent the oxidation of the copper. The wire is fed from a gravity incline t on to the elevator l and is elevated to the muffle and gradually passes through it and out at the outlet end *s* from which it drops into the water tank *d*. The inclined elevator j conveys it to the floor.

The feature of the furnace is in the fact that the steam generated at the outlet end s serves to fill the muffle, and issuing at the inlet end effectually serves as a seal. The use of the water seal at the inlet end is thus obviated.

Cadmium and Magnesium Alloys for Bearings.

Enrique Touceda, the well known chemical engineer and metallurgist of Albany, N. Y., has recently patented the use of some cadmium and magnesium alloys for bearings. Two patents have been granted upon the alloys for this purpose:

In one (934,637, Sept 21, 1909) an alloy of 96.5% of cadmium and 3.5% of magnesium is patented. The magnesium, it is claimed, imparts considerable hardness to the cadmium. At the same time the ductility and malleability of the cadmium are not appreciably altered. The alloy is both hard and tough and, the inventor states, is adapted to carry heavy loads. It also possesses excellent anti-frictional properties.

In the other patent (933,139, Sept. 7, 1909) the use of an alloy of lead, cadmium and magnesium has been claimed. The proportions given are 85% of lead, 10% of cadmium, and from 0.10% to 5% of magnesium. This mixture is intended for a cheaper use than the first alloy.

The specifications of the Pennsylvania R. R. for galvanized iron for roofing call for 4 oz. of zinc per sq. foot of sheet metal. This quantity of zinc is required to be on both sides of the sheet.

Tin Plating.

While tin may easily be deposited from a simple solution of its chloride (tin-salts) the deposit is gray and spongy and unsuited for the majority of work. It is rarely used. Pure tin, of course, is quite white and closely approaches silver in color, and it is usually the desire of those who do tin plating to obtain a white tin deposit. For such a purpose, the formula first described by Roseleur in his *Galvanoplastic Manipulations* is the one most extensively used and capable of producing a very white deposit. It is, however, unsuited for a heavy tin deposit on account of the small quantity of tin that is in the solution, but for ordinary work this is not required. In fact, there does not seem to be any known tin solution that is capable of producing a heavy, bright and smooth tin deposit by electrodeposition.

Roseleur's formula for tin plating is the one almost exclusively used and has withstood the test of time. It is made in the following manner:

Water	5 gallons
Pyrophosphate of Soda ..	6 oz.
Tin Chloride (Tin Salts)	¾ oz.

This solution must be made up in the following manner, otherwise difficulty is apt to follow: The pyrophosphate of soda (this is *not* phosphate of soda) is dissolved in the water and then the chloride of tin dissolved in as small a quantity of water as possible. It does not matter if it is not quite clear. Now add the chloride of tin solution to the pyrophosphate solution, a little at a time and with constant stirring. In this manner it is possible to dissolve all of the chloride of tin and without the formation of insoluble lumps.

The solution is used as hot as possible and with a strong current. The full 6 volts of the electroplating dynamo will have to be used for the anodes and the entire sides of the tubes should be lined with them. Cast anodes of block tin may also be used in case sheets cannot be obtained. The object of using such a large amount of surface is to allow as much tin as possible to dissolve while the solution is in use. Even though this apparently excessive anode surface is used, it is necessary to frequently add some tin salts as the tin does not dissolve from the anodes as rapidly as it deposits.

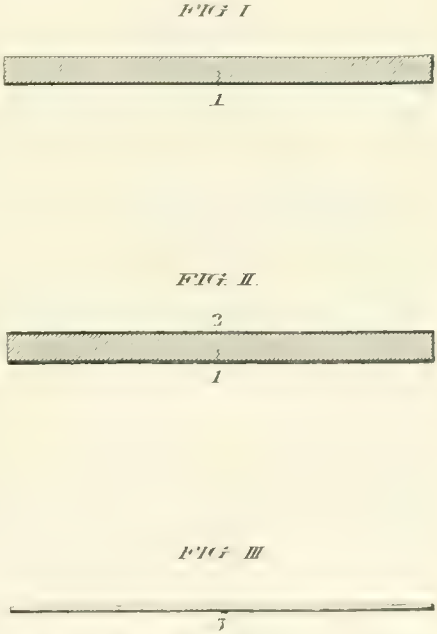
There are several things to which strict attention must be paid in using this tin plating formula:

1. Be sure that the pyrophosphate and *not* the phosphate is used.
2. Use the solution hot.
3. Do not use too weak a current.
4. Use plenty of anode surface.

The deposit of tin obtained from this solution is very white and dead and closely resembles a silver deposit. Indeed, it may be used in place of silver for many purposes and has the advantage that it does not tarnish. Scratch brushing produces a bright surface.

Non-Corrosive Iron Wire.

A novel method of rendering iron and steel wire more non-corrosive than it is possible to obtain from it alone, has been patented by Joseph C. Fraley of Philadelphia, Pa., (U. S. Patent 931,856, Aug. 24, 1909). The process consists in giving the wire a deposit of iron by electrodeposition and then drawing down through dies in the usual manner.



Sketch Illustrating Different Steps in Plating the Iron Wire.

The inventor claims that ordinary iron or steel rusts readily on account of the presence of impurities in it, and the physical structure itself. As pure iron, obtained as an electro-deposit, he says, is more non-corrosive than the commercial metal, a coating on the outside of the wire renders it capable of resisting atmospheric influence better.

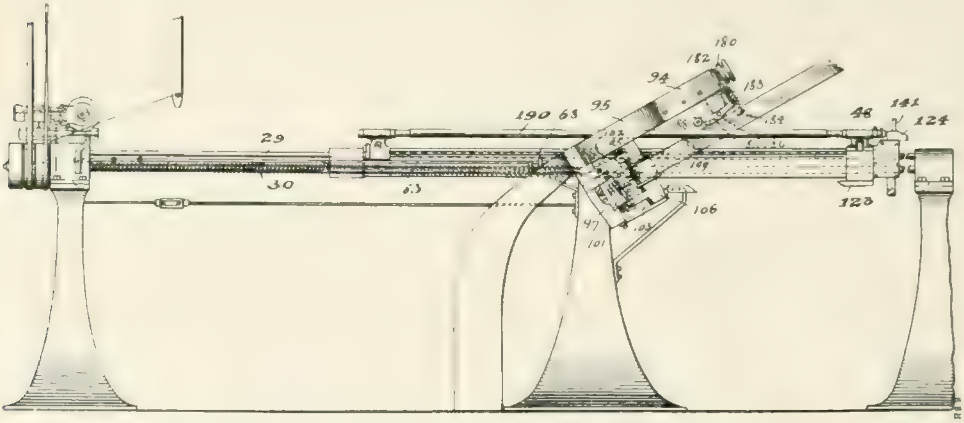
As electrodeposited iron contains hydrogen gas, the coated wire is subjected to heat to drive it off and then drawn down as usual. It is claimed that the heating produces a pure iron and one that is quite non-corrosive. The successive steps in the process are herewith illustrated in the sketch. Fig. 1 shows a wire blank to be treated. In Fig. 2 is a cross section of the blank after the iron has been electrolytically deposited. Fig. 3 illustrates the wire after it has been heated to drive off the hydrogen in the deposit and after drawing down to the finished size. No particular method for depositing the iron is mentioned.

A Novel Machine for Buffing Brass Tubing.

A novel form of apparatus for polishing and buffing brass tubing, such as that used in the manufacture of brass bedsteads, has been patented by John F. Gail of the Simmons Mfg. Co. of Kenosha, Wis., the well known manufacturers of brass beds (U. S. Patent 928,235, July 20, 1909). The apparatus is herewith illustrated.

The brass tubing to be buffed is held between centers and by means of a separately operated device, is moved back and forth while the buffing is taking place, and is also intermittently rotated. In this manner the buffing takes place in the same manner as that done by hand. The buff wheel head, carrying the buffing wheels, is inclined so that any longitudinal scratches are removed. There is also an automatic device for applying the buffing composition to the wheels.

The machine is supplied with a timing device which stops the buffing wheels after a certain period and indicates to the operator that it is time to insert another brass tube. All that is required of the workman who has charge of the machine is to take out the buffed tube and insert a new one.



Sketch of Apparatus for Polishing and Buffing Brass Bedstead Tubing.

A Method of Coating Iron With Copper by Heat.

The coating of iron or steel with copper is easily carried out electrolytically, but the coating obtained is necessarily thin. To obtain a thick coating by this method requires a long time. A method of coating these metals with copper by heat has been patented by Wm. G. Clark of Geelong, Australia. It consists in immersing the article to be coated in molten copper while covered with a flux. This flux is composed of the following:

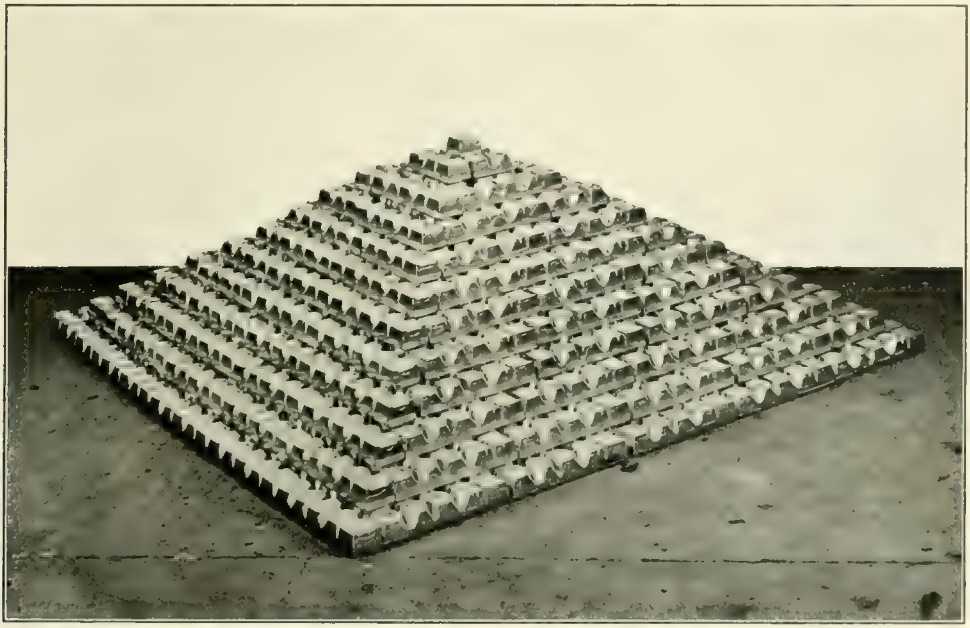
Boracic Acid	15 parts
Tartar	13 parts
Sal-Ammoniac	4 parts

The flux is placed on the top of the molten copper contained in the crucible and serves to clean the iron or steel from rust, when it is immersed, and also to cause a union between it and the copper. It likewise serves to form a smooth, uniform coating.

It is claimed that any form of iron or steel article may be coated by this process, and with a thick coating of copper so much desired for many classes of work.

A Unique Method of Displaying Babbitt-Metal.

A unique method of displaying babbitt metal is herewith illustrated. The manner of making the ingots is also novel. The bottom is cast with five heels, each of which consists of a letter in the name of the company. As a display of the metal to be used for certain forms of advertising, the Dodge Mfg. Co., of Mishawaka, Ind., the well known manufacturers of transmission machinery and who have recently commenced the making of babbitt-metals, arranged their metal in the form herewith illustrated and which is quite effective.



Novel Manner of Advertising Babbitt Metal. Pile Contains 600 Bars and 4000 lbs. of Metal.

In making a recent bore-hole in search of ore, it was found that for every 87½ feet, an increase of temperature of 1 degree F. took place. The bore was made to a depth of 5000 feet. Other tests of a similar nature made in a different portion of the earth's surface, showed an increase of 1 degree for every 64 feet in depth. The Lake Superior copper mines form an exception to this result as they are colder at the bottom than at the surface. The proximity of the cold waters of Lake Superior are apparently the cause of the anomaly.

Experiments on the Electro-Deposition of Brass.

S. Field in *Faraday Society Journal* June 29, 1909 gives the results of some experiments made upon the electrodeposition of brass. The solution used was made by dissolving 100 grams of copper-potassium cyanide and 100 grams of zinc-potassium cyanide in 1200 c. c. of water. The solution was then agitated with some copper carbonate to take up the free cyanide, and then filtered. In this manner a brass solution free from free cyanide was obtained. The solution was heated to a temperature of from 50 to 60 degrees C by means of a glass steam-coil.

It was found that the deposits of brass obtained from such a solution containing no free cyanide were not physically uniform or good. Almost the theoretical quantity of brass, however, was deposited. The author says that, contrary to the usual statements in text books, the potential difference was low. Zinc and copper anodes were used, and the zinc became covered with copper by simple immersion, and it was only by using a heavy current that this deposit could be removed

By the addition of zinc cyanide to the solution, the percentage of zinc in the deposit increased, particularly with a high current density, but the anode became less soluble. Upon diluting the solution, the percentage of zinc in the deposit increased on account of the higher potential difference required to maintain the same current density.

A quantitative deposition of brass occurred only in warm solutions, and an increase in temperature increased the percentage of copper in the deposit.

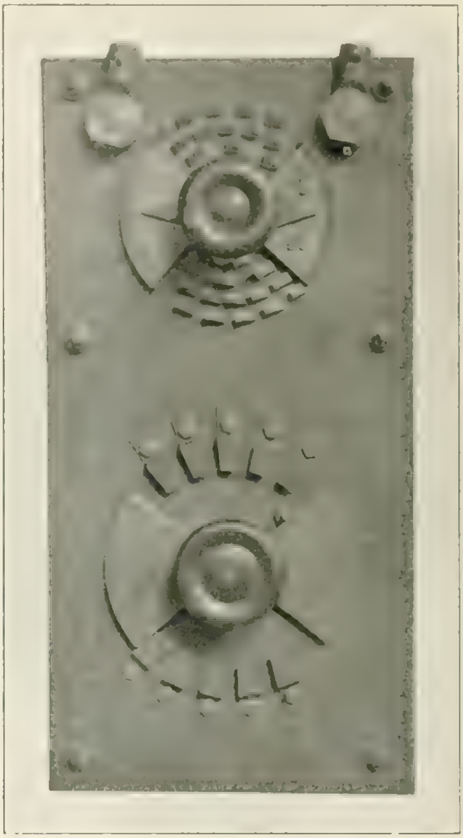
The addition of free cyanide to the solution caused more difficulty in maintaining uniform deposition at ordinary temperatures, while the rate of agitation also had a great effect on the deposit. The author found that a rough deposit of brass was produced when the solution was agitated. The amount of gas generated was also reduced. With appreciable amounts of free cyanide the percentage of copper in the brass deposit was always high, even with a high current density. ,The free cyanide other than by dissolving the coating on the anodes, added little conductivity to the solution. It was also found that the solution was subject to a constant change so that the deposit of brass obtained was not uniform. This change in character of the brass deposit was caused by the use of a small solution so that the copper and zinc were not dissolved from the anodes in the proportions deposited. It is well known that small brass solutions are subject to this difficulty.

The Simplex Plating Rheostat.

The Simplex Electric Heating Co. of Cambridge, Mass., manufacturers of electric heating appliances, are now manufacturing a special form of rheostat for the electroplating trade. It is herewith illustrated.

The resistance sections are of the well-known Simplex Unit System construction. Being sealed from the air by the enamel process, the wire cannot be corroded by acid or acid fumes. The sections are also of very compact construction, permitting a large number to be arranged in a very small space. The unit sections are so proportioned that *one ampere steps between zero and the maximum* rating of the rheostat are obtained or even a finer gradation if necessary.

Each contact on the switch-head and its corresponding resistance section always carries the same amount of current, so it can never be overloaded. With a small current but few steps are in circuit, while with the maximum current all steps are in circuit, but each is only taking its proper proportion of the total current flowing. Contact points of one ampere or less are oval shape bronze clips which rub independently against a movable sector. Contacts for more than one ampere consist of copper switch jaws and a movable knife sector. All contacting surfaces are kept bright by the rubbing movement of the sectors, and there can be no corroded surfaces to cause poor contact, no sparking, or overheating of the parts.



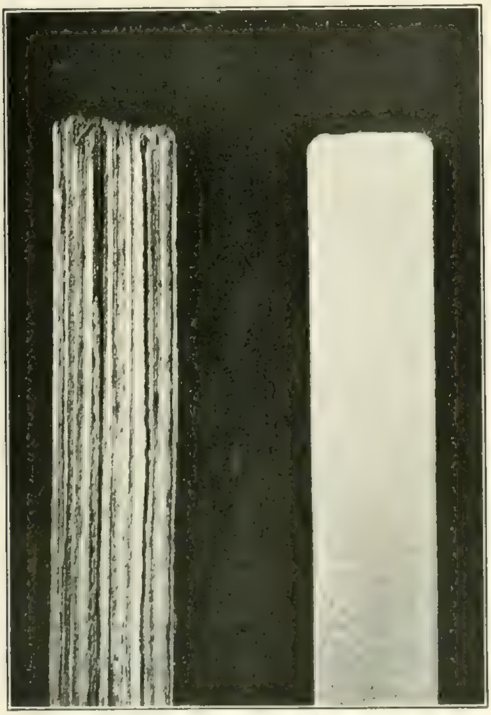
The Simplex Plating Rheostat.

Six standard styles of switch-heads are furnished according to the current capacity required.

It is stated by an authority on copper, that the cost of melting in the reverberatory furnace used in copper refining is from $2.00 to $2.50 per ton of 2000 lbs.

How to Distinguish Between Wrought Iron and Steel.

For many purposes wrought iron is superior to steel, although large quantities of soft steel are now used where wrought iron was previously employed. Wrought iron resists corrosion better than steel, as the slag in the fibres acts as a protective coating when corrosion sets in. For skimmers and stirrers used in brass melting, wrought iron lasts much longer than steel and should be used for this purpose.


Iron. Steel.
Appearance of Iron and Steel after Etching.

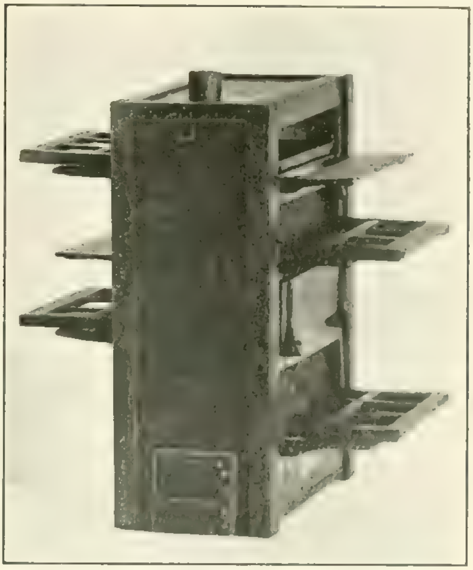
As it is frequently desired to ascertain whether a specimen is wrought iron or steel, a simple test will serve to indicate it. The sample to be tested is cleaned from grease and scale by scouring and then immersed in a solution composed of the following:

Water	9 parts
Sulphuric Acid	3 parts
Muriatic Acid . . .	1 part

The acids are poured into the water and allowed to cool. A glass or porcelain vessel is used. The specimen is allowed to remain in the solution for fifteen or twenty minutes, when it is removed, rinsed in water and dried with a cloth. The fibres will now show plainly; but if not it is returned and allowed to remain longer. As iron is made up of a series of fibres, interspersed between which is the slag, it is a simple matter to distinguish it. Soft steel dissolves uniformly and without the fibrous structure found in wrought iron.

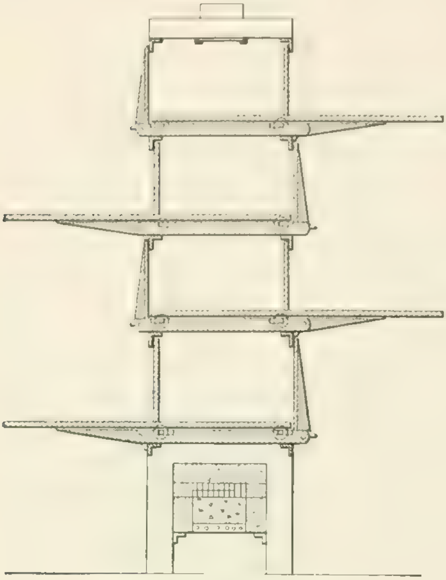
The Johnson Core-Oven.

The "Johnson" core-oven, which has recently made its appearance upon the market, and is manufactured by Joseph J. Johnson of 327 Sussex Ave., Newark, N. J., possesses new and novel features. It is the result of many years of practical experience in the foundry on the part of the inventor. A reproduction of the photograph of the oven is shown in Fig. 1, while in Fig. 2 is shown a cross section.


The "Johnson" Core Oven.

The advantage of the oven lies in the trays for holding the cores during the baking. They are double the depth of the oven so that one end always protects. A partition in the middle of the tray serves to close the door in either position. The swinging door closes the opposite end. The escape of heat from the oven is thus reduced to a minimum.

To charge, the protecting tray is filled with green cores after which it is pushed into the oven. The partition in the middle then forms the door on the far side, while the swinging door tightly closes the front. While the cores are baking, fresh cores may be loaded on the projecting side.



Sectional View of Core Oven.

It may be readily understood that the projecting trays give a very satisfactory method of charging the oven so that not only is much time saved, but a large amount of heat, otherwise wasted, is economized. The oven is made for coal, coke, oil or gas.

A New Device for Lacing Belts With Wire.

A new device for lacing leather belting with steel wire has recently been placed on the market by F. C. Wackerow, 221 West 23rd. St., New York City, and which will prove a most valuable adjunct to factories in which belts are used. While wire for lacing belts has been used for some time, an expensive and stationary machine has been required for doing the lacing. With the device now described, the belts may be laced in any position and in any location.

The appliances consist of a form upon which the belt is fastened to a board as shown in Fig. 1. Holes are then punched through the slots into the belt and the wire passed through and the end clinched. The other half of the belt is then finished in the same manner. One forms the right hand lacing and the other the left. The belt is then placed together and a rawhide key, supplied with the outfit, is passd through the loops of the wire after the belt is placed on the pulley or before, if desired. This key allows the belt to be taken off at any time and replaced without cutting or re-lacing. The appearance of the belt after lacing is shown in Fig. 2.

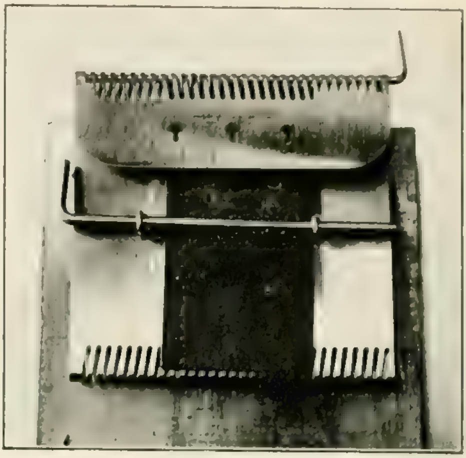


Fig. 1. Manner of Lacing the Belt.

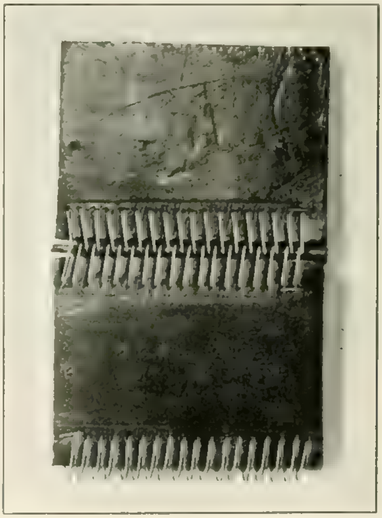
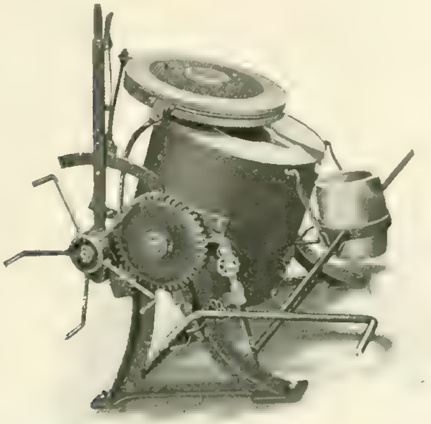


Fig. 2. The Belt After Lacing and Joining.

It is now possible to obtain metallic molybdenum in the massive condition. Up to the present time, it has been produced only in the powdered condition.

An Improvement on the "Steele-Harvey" Furnace.

The Monarch Engineering & Mfg. Co. of Baltimore, Md., manufacturers of the well known "Steele-Harvey" crucible tilting furnace and pioneers in tilting furnace construction, have recently made some improvements upon their furnaces that will meet with the approval of users. The improved furnace is herewith illustrated. It consists of a device at the mouth of the furnace for holding the crucible shank while pouring so that, no matter how much or how little it is tilted, the distance between the pouring lip and crucible remains the same and spilling of metal is thus avoided.


Improved "Steele-Harvey" Furnace.

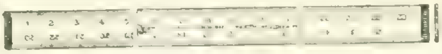
Another improvement is in the method of lifting the furnace cover. It is accomplished by means of a hand lever as shown so that the lifting is easily accomplished and the cover thrown back out of the way.

Hardness of Metals at Increased Temperatures.

The influence of heat on the hardness of metals has been investigated by A. Kurth *Zeitschrift Vereines Deutscher Ingenieure*, who used a three-ton Mohr & Federhaff press arranged in such a manner as to enable the specimens to be maintained at a high temperature, an oil bath being employed for temperatures up to 300° C., a fused mixture of potassium and sodium nitrates between 300° and 500°C., and a mixture of solid carbon dioxide and alcohol for temperatures down to -83° C. The hardness of copper disappears at 1,000° C., while in the case of silver, owing to extrapolation, this result is obtained only at a temperature higher than the fusion point. The hardness of nickel remains constant between 18° and 250° C., while that of aluminum diminishes rapidly as 200° C. is approached. In the case of zinc and tin, time plays an important part with regard to the hardness, even at low temperatures, the ball continuing to sink into the specimen though the pressure remains constant. The ferro-carbon alloys exhibit a minimum increasing with the carbon content (60-220°C.), followed immediately by a fairly constant maximum (210-300° C.). The hardness of the purest iron increases by 50 per cent. between 150° and 250° C.

A New Form of Shrink-Rule.

A new form of shrink-rule for pattern making has recently been placed on the market by the Keufel & Esser Co., of Hoboken, N. J., the well known manufacturers of mathematical instruments. The advantage of the rule is in the fact that on one edge, the graduations run from right to left, and on the other from left to right, so that it is never necessary for a pattern maker to turn the rule end for end.


New Form of Shrink Rule.

The Lake Superior coppers are not so famous for their purity as their uniformity. Electrolytic coppers frequently surpass them in purity, but are apt to lack uniformity in continuous shipments.

Tubing to be bent, such as bicycle handle bars, should be polished before bending. The danger of cutting through the exposed portions during polishing is then reduced to a minimum. If the right method of bending is followed, there is little danger of abrading the tube during the bending operation. This method has now been adopted by many concerns for such work.

Questions and Answers.

QUESTION No. 698. We are having some trouble with brazing solder for brazing copper pipe. We have had the solder (spelter solder) analyzed and the following results were reported:

Copper	52.54%
Lead	.26%
Iron	.14%
Zinc	47.06%

When we apply heat to the spelter it seems to burn up and leave a sort of dirt deposit on the sheet copper and rolls up in bunches. Would you please let us know what is the cause of this difficulty?

Answer. We do not know whether you have used borax in brazing the copper, and if not you should do so. This dissolves the oxide formed when the copper and brazing solder are heated, and gives a clean joint. From your description we should infer that you have not used the borax, and that you have attempted to braze without it. It is impossible to braze without the use of a flux like borax. In using the borax, it should be in the "fused" form. By this is meant crystal borax of commerce which has been melted until it has ceased swelling and a clear glass is produced. It is then pulverized for use. If the crystal borax is used without first melting, it swells on the joint while being brazed, and produces porosity. By the use of the fused borax, an even, uniform joint can be obtained.

QUESTION No. 700. What is a good, reliable, black oxidize for sterling-silver and silver plated goods?

Answear. The method generally used for oxidizing sterling-silver and silver plated wares is the well known liver of sulphur solution. It is employed for oxidizing the greater part of the goods found on the market. From 2 to 3 oz. of liver of sulphur to 1 gallon of water are used and the solution used hot. The surface of the article is then scratch-brushed. This method of oxidizing requires a good, heavy silver deposit, but the black color hangs tenaciously. In case the articles are to be relieved for French-gray work, the addition of a small quantity of ammonia to the liver of sulphur solution will soften it to some extent so that it relieves more easily. Unless the relieving is to be done, however, it is not advisable to use the ammonia.

QUESTION No. 701. I have sent you some chips from the castings that I am making. You will notice that they are very hard. The castings machine with much difficulty. Please advise what makes the castings so hard? Scrap metal mostly is used. My customers complain that the castings are so hard that they cannot use the speed in drilling them which is necessary.

Answer. The trouble is with your metal. You cannot tell what you are using. A miscellaneous lot of scrap is of unknown composition. We should say, from the appearance of your chips, that the metal contains considerable iron and also too much tin. It is perhaps also, deficient in lead. If you experience difficulty in obtaining satisfactory scrap metal suitable for your work, we suggest the use of new metal. For a good composition you will find the following satisfactory:

Copper	10 lbs.
Zinc	1½ lbs.
Tin	½ lb.
Lead	½ lb.

QUESTION No. 702. I am employed in a concern manufacturing trunk hardware and am engaged mostly in brass plating such hardware made of steel. I have several plating machines and also a still tank. In the still tank I do not obtain as good results as in the plating apparatus. The work does not come out as bright. As I have heard that an Eastern trunk hardware firm are racking their work and obtain as good results as in a barrel, I would like to know whether this is so, and whether it is possible to obtain as good results in a still solution as in a barrel?

Answer. If your brass solution is made for producing a bright brass deposit (i. e. contains arsenic) and the goods have a smooth surface before plating, we cannot see why you should not obtain about the same results in either the still solution or the barrel. Inasmuch as the work is constantly tumbled in a plating barrel, it will serve to brighten the surface somewhat. The chief advantage in a plating barrel, of course, is the saving in labor and time. If there is much difference in your work, we should say that your solutions vary.

QUESTION No. 703. Is there a difference in Lake copper? Or are all the Lake brands of equal quality?

Answer. There is considerable difference in the various brands of Lake copper. There are a number of leading brands that are practically equal to one another. The other brands are what are known as "arsenical" or those which contain considerable arsenic. The use of such copper, while not attended with difficulty for some classes of work, cannot be advised for others. Lake copper is usually employed on account of its purity, and as such the best grades only should be selected.

QUESTION No. 704. Can you give us a formula for producing a brass finish on cast-iron keys by simple dipping, the same as done in dip coppering? We have some cheap keys we wish to give a brass finish and thought it might be done economically in this manner. It must be a cheap finish, similar to the sample key sent.

Answer. There is no method known of producing a brass deposit on iron work by dipping. We know of no one doing it in this manner and have never found it possible. You will have to use the regular brass solution if you desire to coat them with brass and deposit it by means of the electric current.

QUESTION No. 705. What can be added to aluminum to render it fluid and easy to pour? I wish to make some small, thin castings in brass molds in which the gates are unnecessarily small. I am at present using an alloy of lead and antimony but the weight of the castings is objectionable. I have obtained some so-called "free-flowing" aluminum alloy, but it does not answer the purpose.

Answer. You will not be able to cast anything except the simplest shapes of aluminum in metal molds. There is nothing that can be added to it to increase its fluidity. On account of the shrinkage of aluminum, it will tear itself apart in the mold if there is no opportunity to contract. We doubt whether you can do what you desire, and will have to adhere to lead and antimony alloys, or spelter. Spelter is lighter than your lead and antimony alloy and makes good castings. Why not try it for your work?

QUESTION No. 706. We have sent to you a sample door lock which has a peculiar finish. The finish itself, as you will note, is steel gray, and it has been cut through by a wheel to the brass underneath. What we desire to know is the finish that is on the lock.

Answer. The steel-gray color on the brass lock is easily done by means of an arsenic solution made up in the following manner

Water	1 gallon
White Arsenic	10 oz.
Caustic Soda Sticks	4 oz.

The caustic soda is dissolved in the water. heated and the white arsenic added and the whole heated for some time until the arsenic dissolves. If any remains undissolved it does no harm as it settles to the bottom of the tank. The white arsenic used should be finely powdered in order to dissolve easily. Use from 2 to 3 volts and with the solution cold. The deposit at first becomes iridescent, and then assumes a steel-gray color. From fifteen to twenty minutes will give a good deposit for your work. It can then be "striped" by the wheel and finally lacquered.

QUESTION No. 707. What is the formula for the babbitt-metal used on the various railroads in the United States? Is there any standard mixture used by them?

Answer. There is no standard formula in general use on the railroads of the United States. For freight car bearings which are made of cheap brass and lined with so-called "babbitt-metal", there is nearly a standard formula and it is the cheapest lead and antimony mixture possible. It is generally composed of about 15 per cent of antimony and 85 per cent of lead, but varies a few per cent either way. For a better grade of babbitt-metal for use on locomotives, a mixture after the usual formula for "genuine-babbitt" is employed. It is the practice of most of the railroads to use locomotive bearings and passenger car bearings unlined, but there is no uniform practice in this respect. There is great diversity of mixtures in this line of work.

QUESTION No. 708. What is the effect of adding ammonia in excess to a nickel plating solution so that it has an alkaline reaction to test paper, and also smells slightly of ammonia? Our plater found that his nickel plating solution was acid to test paper and added too much ammonia so that it smells slightly of it. The nickeled work that we are now obtaining is not satisfactory, and it is our opinion that the addition of the ammonia has caused it. What kind of a deposit is obtained in a solution of this character?

Answer. Nickel plating solutions which contain an excess of ammonia do not give good deposits. They are dark colored and brittle. Under such conditions they frequently peel when buffed. The ammonia seems to make the nickel hard. You should use sulphuric acid cautiously until the solution is just barely acid.

QUESTION No. 709. What kind of glassware is best to use for making experiments in the plating line? I desire to try some chemical experiments in connection with electroplating and have found that there is a difference in the quality of the beakers and flasks purchased. Some break more easily than others.

Answer. There are two kinds of glassware sold that are satisfactory for your purpose. One is the Bohemian glassware and is made in Bohemia. The other is the Jena brand and is made in Germany. While the Jena grade stands changes in temperatures better than others, they are often of irregular thickness and are easily broken. The Bohemian glassware has been used for many years and is very satisfactory.

QUESTION No 714. Are the church bells made in this country cast of bronze or steel? If they are made of bronze, what kind of a mixture is used for the purpose?

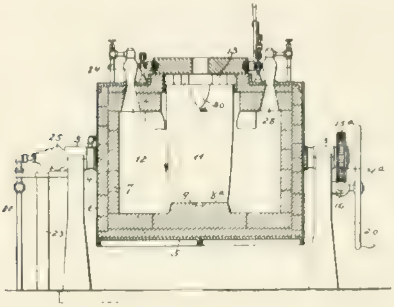
Answer. Very few bells are now manufactured of anything except the best bronze as it has been found impossible to obtain the tone from other alloys. The regular mixture for such a purpose is composed of 4 parts of copper and 1 part of tin. Steel bells are cheaper and of poor tone. They are now used to a much less extent than formerly.

QUESTION No 715. We have a cyanide copper solution that we wished to heat and ran a steam pipe of lead in the tank. Soon after it began to leak, and we then lined the tank with sheet lead. The copper deposit then became dark. Do you think the lead caused it?

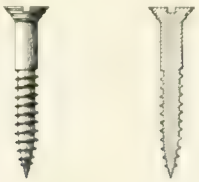
Answer. The lead was undoubtedly the cause of the dark copper deposit. Lead is slightly soluble in cyanide solutions and the amount that dissolved probably caused your trouble. Use an iron steam pipe for heating. It is not attacked by cyanide solutions.

Patent Abstracts.

932,906, Aug. 31, 1909. CRUCIBLE FURNACE. Walter S. Rockwell of New York City. Assignor to the W. S. Rockwell Company of the same city. This furnace consists of a tilting body equipped with burners on each side for producing a greater heat than can be obtained from a single burner. The heat is more intense and high melting metals, like nickel, may be melted in the furnace. The burners are situated on each side of the crucible, and point downwards so that the flame does not impinge upon the crucible. The furnace is intended to be used with oil or gas and these, with the air employed for the blast, are introduced through the trunnions. This furnace is intended for use with large crucibles and in which a greater volume of heat is required.

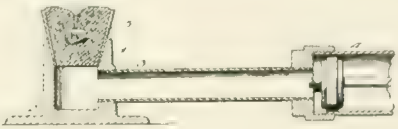


933,865, Sept. 14, 1909. SCREW. Augustus Umholtz of Magnolia, N. J. The under side of the screw head is grooved, as illustrated, so that it gives the maximum resistance against drawing into the wood when screwed into it.

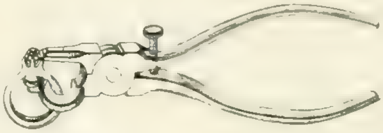


933,036, Aug. 31, 1909. METALLIC COMPOUND OR COMPOSITION OF MATTER AND PROCESS OF MAKING SAME. Frank A. Headson of La Fayette, Ind. A composition for plugging holes in castings, stopping leaks in steam pipes and boilers, etc. It is composed of metallic iron (finely divided) 78 parts; iron sulphate, 8 parts, plaster of Paris, 7 parts; silicate of soda, 3 parts; Portland cement, 2 parts; and graplate, 2 parts.. These substances are mixed with water to a paste and applied. The composition is intended principally for iron.

932,508, Aug. 31, 1909. DENTISTS' CASTING APPLIANCE. Nathan H. Smith of Seattle, Wash. An appliance for casting metal under pressure. Applicable to small castings for dentists and other uses. The mold is made of two-thirds of silex and one-third plaster of Paris. It is dried and placed under the crucible 5 in which the metal is melted by the blowpipe. When melted, the pump 4 is used to exhaust the air and cause the metal to fill the mold. The pattern used is made of wax and imbedded in the plaster, after which the mold is baked to dry it and melt out the wax.

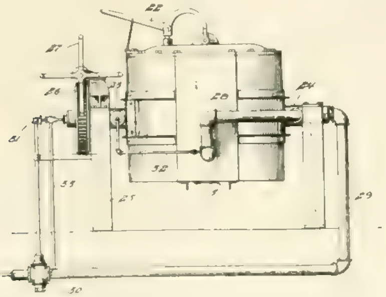


933,749, Sept. 14, 1909. JEWELERS' PLIERS. Balfour Feagle, of Longview, Texas. Pliers intended for use in binding the prongs of a ring mounting around the set.



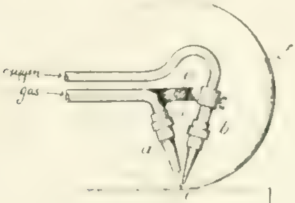
933,982, Sept. 14, 1909. COMPOSITION OF MATTER FOR MOLDS. Richard Herbst, New York City. The use of finely crushed silica for a mold used for casting metals is claimed. In some instances 5% of chalk are employed to "soften" it as the inventor says. It is claimed that the mass mixed with water may be molded on account of "the adhesion of the individual particles due to the irregular surfaces of the same." The fact that the mold will stand great heat is cited as an advantage.

933,501, Aug. 31, 1909. CRUCIBLE FURNACE. William Scrimgeour of Portsmouth, Va. A crucible furnace of the tilting type intended for use with oil or gas. The furnace is constructed with a combustion chamber which is heated by the waste gases which pass out. In this manner the temperature of the flame is increased and economy of fuel obtained. The fuel passes through the trunnions of the furnace.

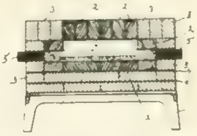


934,278, Sept. 14, 1909. METHOD OF MANUFACTURING NICKEL AND NICKEL-COPPER ALLOYS. David H. Browne of Copper Cliff, Canada. Assignor to the Canadian Copper Co. of Cleveland, Ohio. A method of reducing metallic nickel or an alloy of copper and nickel (as it usually occurs in nature) to the metallic condition from its sulphide ores. The sulphides are heated in an electric furnace with lime. The sulphur combines with the lime, forming calcium sulphide, sulphur dioxide escapes, and metallic nickel or an alloy of copper and nickel is produced.

932,740, Aug. 31, 1909. DEVICE FOR SEVERING METAL BODIES. Ernst Wiss of Griesheim-on-the-Main, Germany. Assignor to the Chemisch Fabrik Griesheim of Frankfort, Germany. A form of blowpipe for use with hydrogen (or other hydrocarbon gas) and oxygen, and intended to cut large bodies of metals. The blowpipe is mounted upon a carriage so that it may readily be moved along the surface of the metal to be cut

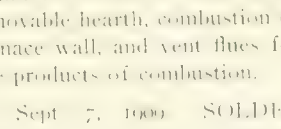


933,815, Sept. 14, 1909. ELECTRIC FURNACE. Thaddeus Baily of Alliance, Ohio. A resistance furnace so constructed that the resistance material may be easily renewed and maintained at the right temperature without excessive oxidation. The furnace is constructed of fire brick for the casing and a non-metallic resistance material usually of coke. The construction of the furnace is the essential feature.



932,622, Aug. 31, 1909. COMPOSITION OF MATTER. Tillman D. Lynch of Wilkinsburg, Pa. and John J. Crane of Swissvale, Pa. Assignors to the Westinghouse Electric & Mfg. Co., of East Pittsburg, Pa. A cement intended for use in sealing electrical appliances, such as transformers, etc., and consisting of Brick-dust 40 parts; Rosin 29 parts; Kaolin 18 parts; Asphalt 13 parts. It is claimed that the cement has a high resistance and also much holding power.

933,022, Aug. 31, 1909. BLANK FURNACE. Wm. Scrimgeour of Portsmouth, Va. Assignor to the Mircs Fuel-Oil Equipment Co. of Norfolk, Va. The furnace is intended for annealing metals. Oil is used for the fuel and the essential feature lies in the use of a movable hearth, combustion chambers in the furnace wall, and vent flues for carrying off the products of combustion.



933,433, Sept. 7, 1909. SOLDER FOR ALUMINUM. Jacques F. Guggenbuhl of Paris, France. A solder for soldering aluminum and composed of zinc, 85%, copper, 10.7%, and aluminum, 4.3%. It is used in the ordinary manner, preferably with a blowpipe.

933,318. Sept. 7, 1909. SOLDERING IRON. Howard Marshall of Kingfisher, Oklahoma. A soldering iron for use in corners and limited spaces in soldering electrical connections

Trade Items.

The Fiat Automobile Co., are to spend about $1,000,000 for buildings and equipment of their new plant to be built at Poughkeepsie, N. Y.

A new brass foundry, 102 x 100 feet will be built by the Hancock Mfg. Co., of Charlotte, Mich. The building will be one story high.

The Gamon Meter Co., have started to manufacture water meters at 75 Hamilton St., Newark, N. J. A brass foundry has also been equipped for making their own brass castings and is now in operation.

The Sudbury Construction & Machinery Co. Ltd., has been incorporated in Sudbury, Canada with a capital stock of $40,000 to make iron and brass castings. Machine and repair work will also be carried on.

The Levett Mfg. Co., of Matawan, N. J., manufacturers, importers, and exporters of platers' supplies, polishing materials and dynamos, have opened an office at 407 Canal St., New York City to take care of their increasing trade in that section.

Luther Hill, 1142 Dewey Ave., Los Angeles, Cal., is shortly to start a large job plating plant in that city. The location has not been selected, but when it is, new equipment will be purchased. In the meantime, he is desirous of obtaining catalogues and information about plating supplies and equipment.

The new works of the Sterling Machine & Stamping Co., at Wellington, Ohio, are now in operation in the manufacture of pressed steel goods. An electroplating department is already in operation and a brass foundry will shortly be started. The company recently moved from Vermillion, Ohio, to this place where a new factory had been built.

The W. S. Rockwell Co., 50 Church St., New York City, are sending to the trade their illustrated folder describing some of the furnaces which they manufacture. This folder is sent out pending new catalogues which are now in the hands of the printer, and is intended to indicate the line of furnaces and oil burning appliances which are manufactured by them. Many illustrations of furnaces for a large variety of work, oil-burners, pumps, blowers, etc., are shown.

The United States Alloys Company has been organized in Baltimore, Md., to manufacture metals, alloys, and fluxes. W. A. C. Pape is at the head of the company and the principal products will be manganese, manganese-copper, manganese-bronze, silicon copper, aluminum-bronze, copper, tin, lead, antimony and bismuth. Fluxes for brass foundries will also be manufactured. In addition to the preceding products, a line of ferro alloys will be produced. The works of the company are at Curtis Bay, Md., and the office 1206 American Bldg., Baltimore. The works will be in charge of Mr. Pape. The products of the company will be of the highest grade only.

Bishop Bros., have been organized at 151 Pine St., Providence, R. I., to make a line of electro-plated jewelry.

The Burlington Brass Works of Burlington, Wis., manufacturers of plumbers' brass goods, are to erect a new addition to their plant. It will be 75 x 150 feet and will be equipped with the sprinkler system.

The A. Buch's Sons Co., of Elizabethtown, Pa., manufacturers of several types of molding machines, have opened a sales office and demonstrating plant at 999 North Marshall St., Philadelphia, Pa.

The Glacier Metal Co., of Richmond, Va., manufacturers of babbitt-metals are to commence the manufacture of fibrous metallic packing. It will be sold under the name of "Silver Metallic Packing."

The Independent Plating Co. have started in business at 55 Lincoln St., Boston, Mass., and are now engaged in copper, brass, nickel and other kinds of job plating work as well as polishing.

The Hanson & Van Winkle Co., 219 Market St., Newark, N. J., are to build a new and handsome office building for their own use. It will be of reinforced concrete throughout. The American Concrete-Steel Co. of Newark are the engineers and contractors for it.

The California Metalized Rose Co., has started in the manufacture of metalized hatpins and other flower novelties at 715 South Flower St., Los Angeles, Cal. They are employing the Richmondt process for this work. C. D. Richmondt is the factory manager and A. L. Sullivan the office manager.

The affairs of L. Boardman & Son, of East Haddam, Conn., manufacturers of silver plated hollow-ware, will shortly be wound up and the business discontinued. A few years ago the plant was practically destroyed by fire and from which the business has greatly suffered. This concern is one of the oldest in the business and were noted for the character of their goods.

The J. W. Paxson Company of Philadelphia, Pa., the old and extensive manufacturers and dealers in foundry supplies of all descriptions, desire to call attention to the quality of their riddles and bellows for brass foundry use. The riddles are very strongly made, so that the rough usage which they receive in the hands of a molder, will not injure them. They are also made with a sand paper finish which allows the riddle to be held with a firm grip while the sand is being riddled. The bellows which they manufacture is made of the best quality of leather found for the purpose and especial attention has been paid to its construction so as to adapt it to foundry use. They are far superior to ordinary bellows for brass foundry use and no one should purchase without first investigating.

The Newfield Plating Company of Bridgeport, Conn., job platers, have moved to 386 John St., where larger quarters have been obtained.

The Appleton Wire Works of Appleton, Wis., manufacturers of wire and wire cloth, are erecting a new two-story plant 40 x 100 and which will be used as a weaving room.

The Ontario Brass Foundry of New Toronto, Canada, has commenced work in the brass foundry formerly occupied by the Canada Brass Foundry. The plant had been idle for several years.

The fire which visited the plant of the S. Obermayer Co., of Cincinnati, Ohio, manufacturers of foundry supplies and equipment, on Sept. 11th, was insignificant and damaged only their warehouse. Business was not interrupted at all by it and all orders were filled with their customary promptness.

The International Achson Graphite Co., of Niagara Falls, N. Y., manufacturers of artificial graphite products, are now making electrotypers' graphite of high purity. This purity is of much advantage in electrotyping as the conductivity of the graphite is then correspondingly high. They are also making graphite for filling dry batteries and for the manufacture of paint.

The Pacific Metal Works of Portland, Oregon have secured a site and will erect a new plant to include a foundry. The output of babbitt-metals and solders, of which this company are large makers, will then be doubled. A larger stock of metals, such as copper and brass sheet, wire, tin plate, etc., will be carried. The foundry will be 30 x 70 feet and the warehouse 10 x 10 feet.

The "Hascoline Compound", manufactured by Haas Bros. Co., Newark, N. J., is adapted particularly for the drilling, cutting, tapping, drawing, and re-drawing of metals of all kinds. When used for these purposes, it cools the metals and never separates while in service. It also dissolves readily without foaming and is quite low in price. They also manufacture "Hascoline Burnishing Compound" for use with steel balls in burnishing metals by the tumbling barrel process. It is in use by some of the largest concerns for such work.

The Coe-Stapely Company has been organized in Bridgeport, Conn., by B. L. Coe, W. S. Stapely, B. S. Coe, Ellery B. Shoemaker and others, formerly of the Bridgeport Brass Co. B. L. Coe has been treasurer of this company for some time, W. S. Stapely superintendent of the manufacturing department, E. B. Shoemaker with the New York office and B. S. Coe has had charge of the New York office for the past five years. The new company will manufacture brass goods and other metal specialties. B. L. Coe is the president; W. S. Stapely vice-president and general manager; B. S. Coe, treasurer, and Ellery B. Shoemaker, secretary. A factory will shortly be obtained and manufacturing commenced.

Geo. E. Messenger of Des Moines, Iowa, has acquired the foundry of the Criterion Brass & Motor Co., in that city, and will operate it.

The National Conduit & Cable Co., of Hastings, N. Y., manufacturers of copper wire and cables, brass and copper tubing, and sheet metals, are installing a 1000 h. p. steam turbine and condensing plant.

The Royal Silver Plate Co., of Norfolk, Va., electroplaters, have purchased the plant of Nettleton Bros., 65 Fayette St., in that city, and will operate it. Electroplating will be carried on.

W. Bradel & Co., have started in the job plating business at 88 McWhorter St., Newark, N. J. They make a specialty of gold and silver plating, ormolu and other modern finishes for the trade.

The Stover Mfg. Co., of Freeport, Ill., manufacturers of hardware, machinery and other lines of goods, have now added a new line of art metal goods to their other lines. Brass candlesticks are one of the varieties of wares that they are now manufacturing.

The plant of the Michigan Plating Co., of Grand Rapids, Mich., has been acquired by the John Knape Machine Co., of Grand Rapids and will be operated by them. Display fixtures, and pressed metal work are manufactured by them.

The Rockwell Furnace Co., 26 Cortlandt St., New York City, are sending out to the trade their new and extensive catalogue of forging, heating and welding furnaces. This catalogue is 9 x 12 inches and is profusely illustrated with photographic reproductions.

J. A. Van Brunt & Co., Inc., 100 William St., New York City, are headquarters for the highest grade of refined fusel oil and amyl-acetate for use as thinner for lacquers or for lacquer manufacture. When in the market for such materials ask them for quotations as they are prepared to make attractive prices for the best grade of goods.

The American Bronze Co., recently incorporated in Buffalo, N. Y., with a capital stock of $25,000, to manufacture brass, bronze and aluminum castings as well as manganese bronze and phosphor-bronze, has taken over the plant and business of the Work Casting Co., at Niagara St. and West Delavan Ave. F. G. Northrop is the general manager.

McCambridge & Co. Ltd., 20th and Wood Sts., and the William S. Cooper Brass Works, 1126 Hamilton St., of Philadelphia, both manufacturers of plumbers' brass goods, have consolidated under the name of the McCambridge & Cooper Co. The plants of the Wm. S. Cooper Brass Works will be abandoned and all the manufacturing conducted at the McCambridge works. All of the brass foundry work will also be done at their plant. As a charter has not yet been obtained there is only a working agreement and business is not yet done under the new name.

The Central Foundry & Machine Co., has been organized at Marion, Ind., to manufacture iron, brass, bronze and aluminum castings.

The Whelchel Electric Co., Anderson, Ind., has been organized at Anderson, Ind., with a capital stock of $25,000 to manufacture electrical supplies.

The General Brass & Tool Works has been incorporated at Nashville, Tenn., with a capital stock of $10,000. J. H. Lawrence, G. C. O'Bryan and C. C. Traube are the incorporators.

A site has been purchased at Lombard and Sutton Sts., Baltimore, Md., by the Florence Silver Plate Co., of that city, now located at 530 North Gay St. A new factory for the manufacture of silver plated goods will be built.

A twelve page booklet on "Foundry Facings" has just been issued by the Joseph Dixon Crucible Co., of Jersey City. A description of the various kinds of facings and blackings manufactured by them is described in it. The booklet will be mailed to anyone interested upon request.

Aluminum founders who desire to purchase zinc chloride as a flux for use in melting can obtain it from the Franklin H. Kalbfleisch Company, New York City, as they announce that they are now headquarters for it. The use of zinc chloride as a flux in melting aluminum, is now becoming quite extensive.

The Cassady-Fairbank Mfg. Co., 6106 La Salle Ave., Chicago, Ill., manufacturers of household hardware, steel stampings and other metal goods of the same class, are starting work upon their new addition on La Salle St. It will be 58 x 200 feet, four stories high and thoroughly up to date in every way.

The Arrow Electric Co., of Hartford, Conn., manufacturers of electrical specialties, have acquired the complete stock, business and plant of the Marshall Electric Co., of Hyde Park, Mass. Both plants will be operated for the present, but later the plants will be consolidated and a new factory erected in Hartford.

F. C. Wackerow, 221 West 23rd St., New York City, is now placing upon the market, the "Square Belt Lacer" that laces ordinary belts with wire. The appliances used are quite inexpensive and should be in every establishment which has belts as it is possible to make the highest grade of wire lacing in any part of the shop. The device is easily carried from place to place wherever needed.

The S. Obermayer Co., of Cincinnati, Chicago and Pittsburgh, after several years of experimenting, have succeeded in producing a new core wash of unique properties. The object of a core-wash is to prevent the metal from adhering to the core and also to impart a smooth, clean surface to it. This core wash has been found to answer so well that the makers have termed it "Bull Dog Core Wash". It has remarkable adhesive qualities. The method of using it will be sent upon request.

The Crowe Mfg. Co., has been incorporated at Hamilton, Canada, with a capital stock of $40,000 to manufacture valves.

The Racine Brass & Iron Co., of Racine, Wis., is erecting a large addition to their plant. It has been made imperative by the increase of their business.

The Brantford Steel Range Co., Ltd., of Brantford, Canada, recently organized to manufacture ranges and stoves, have already begun manufacturing. A new plant will be started at the beginning of the new year.

The Reliance Motor Cycle Co., of Oswego, N. Y., manufacturers of motor cycles, are to engage in the manufacture of automobiles. An addition, 40 x 150 feet is to be built for this purpose.

The Dodge Mfg. Co., of Mishawaka, Ind., states that it now has the largest plant in the world devoted to the manufacture of transmission machinery. The buildings cover over 40 acres and in addition to the large consumption of other raw materials, over 2,000,000 lbs. of babbitt-metals are produced annually.

The American Metal Hose Co., 173 Lafayette St., New York City, are now manfucaturing a special flexible metallic hose for use as the flexible arm of portable electric lamps. It is finished in nickel, oxidized copper, antique or polished brass. This hose will stay in any position and will not spring back.

The new plant of the Crane-Best Co., at Oakmont, Pa., to be one of the largest of the plants under the Crane management, which has been under course of construction for some time, has had operations upon it practically suspended. It is reported that the suspension has taken place on account of lack of harmony in the consolidation plans.

The Crescent Phosphorized Metal Co., Philadelphia, Pa., are one of the oldest manufacturers of phosphor-tin, phosphor-copper, phosphor-bronze and manganese-copper in the United States and are prepared to supply large or small quantities of these materials. They are of the highest grade and are supplied in a form convenient for use. In addition to the aforesaid metals, phosphorus is also supplied to the trade whenever desired.

Attention is called to the fact that the Diamond Metal Remedy Co., 1803-1811 John St., Cincinnati, Ohio, are placing upon the market their "Diamond Brass Remedy" which is now extensively used as a flux in making brass castings. It renders all kinds of brass mixtures exceedingly dense and homogeneous, prevents blow-holes and purifies the metal. It should also be noted that this material is not a new one, but has been on the market for a long period and has withstood the test of time. Those who use it, therefore, will feel safe that their metal is improved by it as claimed as ample time has been had for thoroughly testing it. It has never failed to give satisfaction wherever used. It also completely removes iron from the brass.

The H. E. Mills Mfg. Co., of Syracuse, N. Y., are having plans drawn for a new factory to be built in Solvay, N. Y., in which foundry supplies will be manufactured.

The capital stock of the Indianapolis Brass Co., Indianapolis, Ind., of which M. W. Kelly is the president, has been increased from $10,000 to $25,000.

The W. S. Tyler Co. of Cleveland, Ohio, manufacturers of fine wire and wire cloth, artistic wire work etc., are to make an addition to their plant and also install a new power plant.

The Powers Burglar Proof Sash Lock Co., of Hastings, Neb., recently incorporated to manufacture a pressed steel sash lock, have decided to have their goods made by outside parties for the present and will not engage in manufacturing them.

The Empire Novelty Co., has been incorporated at Canton, Ohio, with a capital stock of $60,000 to manufacture metal toys and novelties. A two story brick building, 100 x 36 feet, is to be built and will be ready by the first of the coming year.

The Langelier Mfg. Co., of Providence, R. I., are now making a heavy tube swaging machine for swaging tubing up to 4 in. in diameter. It will also swage solid rods up to 3 inches. It is particularly applicable to the manufacture of automobiles in which tubing is now extensively used.

The Bristol Co., of Waterbury, Conn., manufacturers of Bristol's Recording Instruments and Pyrometers, are sending out to the trade their Bulletin No. 111 which describes the Bristol Class 11 Recording Thermometers adapted especially for feed water temperatures. This Bulletin will be sent upon request.

Another large addition is to be made to the plant of the International Acheson Graphite Co., in Niagara Falls, Ont. This addition will contain a grinding plant in which electrotypers', lubricating, and other grades of finely powdered graphite will be made. It will also contain a stock room This plant is a branch of that on the American side of the Falls.

The Metzger Motor Car Co., has been incorporated in Detroit, Mich., with a capital stock of $500,000, with $300,000 paid in, and will manufacture automobiles. The factory and plant formerly occupied by Jacob Meier on Milwaukee Ave., and Grand Trunk Ave., in the manufacture of trunks, has been taken and manufacturing will shortly be commenced.

The S. Obermayer Co., of Cincinnati, Ohio, are sending out to the trade the new and extensive catalogue of the Cincinnati Electrical Tool Co., for which they are the selling agents, describing the "Peerless" electrical tools made by them The catalogue is compiled in a very attractive manner and is well illustrated with the tools Tools for chipping, grinding, polishing, buffing and many other operations are described in it.

The Gold and Silver Reducing & Smelting Co., has been incorporated at Lowville, N. Y.

The plant of R. E. Sturdy, 190 Eddy St., Providence, R. I., electroplater of jewelry, has been greatly improved and the business re-organized so that it is one of the most complete in the East.

Obituary.

J. Whitcomb Cotton, president of the American Tube Works of Boston and Somerville, Mass., died on Sept. 7th, in Peterboro, N. H., from apoplexy.

John F. Zucker, vice-president of the Geo. Zucker Co., of Newark, N. J., manufacturers of polishing compositions, committed suicide at his home in East Orange, N. J., on Sept. 18th.

Edward T. Coe, who until retirement a few years ago, was treasurer of the Coe Brass Co., of Torrington, Conn., for many years, died on Oct. 5th, at his home in New Haven at the age of sixty-one.

Personal.

T. P. Gourley, the well known furnace expert, is now associated with J. B. Wise of Watertown, N. Y., manufacturer of the M. R. V. brass melting furnace.

At a recent meeting of the Board of Managers of the New York Metal Exchange, Charles H. Robb of C. W. Leavitt & Co., New York City, the well known metal and ore dealers, and Daniel M. Brady of the Brady Brass Co., of New York, were elected members.

Charles J. Caley, general manager of the Russell & Erwin Mfg. Co., of New Britain, and formerly president of the American Brass Founders' Association, has resigned his position on account of ill health. He still remains upon the board of directors.

W. G. Rowell, formerly of W. G. Rowell & Co., Bridgeport, Conn., brass founders and finishers, is now representing R. B. Seidel Inc., of Philadelphia, Pa., the well known crucible manufacturers, and will look after the Eastern trade.

W. M. Corse, Secretary and Treasurer of the American Brass Founders' Association, has severed his connection with the Michigan Smelting & Refining Co., of Detroit, Mich., and has become associated with the Lumen Bearing Co., of Buffalo, N. Y., in the capacity of Works Manager.

Dr. Charles B. Dudley, who for many years has been at the head of the testing and chemical departments of the Pennsylvania Railroad at Altoona, Pa., was elected president of the International Association for Testing Materials at the Convention recently held at Copenhagen, Denmark. In 1912 the next convention will be held in the United States.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Acetone, pure, 98%	lb.	.22
Acid, Acetic, pure, 30%	lb.	.07
Acid, Arsenious (White Arsenic)	lb.	.20
Acid, Benzoic	lb.	[illegible]
Acid, Boracic (Boric), pure	lb.	.12
Acid, Hydrochloric, see Acid, Muriatic		
Acid, Hydrofluoric, 30%	lb.	.04
Acid, Hydrofluoric, 50%	lb.	.10
Acid, Muriatic, 20°	lb.	.02
Acid, Muriatic, c. p., 20°	lb.	.07
Acid, Nitric, 38°	lb.	.05½
Acid, Nitric, 40°	lb.	.05⅞
Acid, Nitric, 42°	lb.	.06¼
Acid, Nitric, c. p.	lb.	.08
Acid, Sulphuric, 66°	lb.	.01¼
Acid, Sulphuric, c. p.	lb.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	lb.	.04
Aluminum, Sulphate	lb.	.06
Aluminum, Metallic in Ingots	lb.	.24
Aqua-Fortis, see Acid, Nitric.		
Ammonia Water (Aqua Ammonia), 20°	lb.	.04¾
Ammonia Water (Aqua Ammonia), 26°	lb.	.06¼
Ammonia Water, c. p.	lb.	.08
Ammonium Carbonate, lump	lb.	.15
Ammonium Chloride (Sal Ammoniac)	lb.	.12
Ammonium Hydrosulphuret	lb.	.30
Ammonium Sulphate	lb.	.07
Ammonium Sulphocyanate	lb.	.50
Amyl Acetate	gal.	1.85
Antimony	lb.	.08¼
Arsenic, Metallic	lb.	.15
Arsenic, White (Acid Arsenious)	lb.	.20
Argols, White (Cream of Tartar)	lb.	.31
Asphaltum, Commercial	lb.	.05
Asphaltum, Egyptian (Bitumen)	lb.	.30
Benzine	gal.	.15
Benzol, Pure	gal.	.75
Bismuth, Metallic	lb.	1.75
Bitumen, see Asphaltum		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	lb.	.10
Borax Glass	lb.	.35
Cadmium, Metallic	lb.	.75
Carbon Bisulphide	lb.	.10
Calcium Carbonate (Precipitated Chalk)	lb.	.10
Chrome-Green	lb.	.50
Copper, Lake, (cask)	lb.	.13
Copper, Lake, (carload)	lb.	.13¼
Copper, Electrolytic (carload)	lb.	.13
Copper, Electrolytic (cask)	lb.	.13¼
Copper Casting (carload)	lb.	.13
Copper, Casting (cask)	lb.	.13⅛
Copper Acetate (Verdigris)	lb.	.35
Copper Carbonate, dry	lb.	.25
Copper Sulphate (Blue Stone)	lb.	.09
Copperas, see Iron Sulphate		
Corrosive Sublimate, see Mercury Bichloride.		
Cream-Tartar, see Potassium Bitartarate		
Cryolite	lb.	.12
Cyanide, see Potassium Cyanide		
Dextrin	lb.	.15
Emery Flour	lb.	.04
Emery F F & F F F	lb.	.03
Flint, powdered	lb.	.01
Fluor Spar	lb.	.01¼
Fusel Oil	gal.	1.75
Gold Chloride	dwt.	.60
Gum, Copal	lb.	.30
Gum Guaiacum	lb.	.26
Gum Mastic	lb.	.40
Gum Sandarac	lb.	.35
Gum Shellac, brown	lb.	.50
Gum Shellac, white	lb.	.60
Iron Perchloride	lb.	.25
Iron Sulphate (Copperas)	lb.	.05
Lead Acetate (Sugar of Lead)	lb.	.15
Lead, Pig	lb.	.04½
Lead, Red	lb.	.12
Lead, Yellow Oxide (Litharge)	lb.	.12
Liver of Sulphur, see Potassium Sulphide		
Manganese, Ferro 80%	lb.	.10
Manganese, Metallic, pure	lb.	.75
Magnesium, Metallic	lb.	1.50
Mercury Bichloride (Corrosive Sublimate)	lb.	.93
Mercury, Metallic (Quicksilver)	lb.	.89
Mercury Nitrate	lb.	1.70
Mercury Oxide, yellow	lb.	1.80
Nickel and Ammonium Sulphate (Double Salts)	lb.	.16
Nickel Carbonate, dry	lb.	.60
Nickel Chloride	lb.	.50
Nickel Metallic	lb.	.47
Nickel Sulphate (Single Salts)	lb.	.25
Nitre (Saltpetre), see Potassium Nitrate		
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	lb.	.15
Phosphorus, yellow	lb.	.40
Phosphorus, red	lb.	1.10
Pitch	lb.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	14.50
Platinum Metallic	oz.	30.25
Potash-by-Alcohol, in sticks	lb.	.50
Potash, Caustic (Potassium Hydrate)	lb.	.08
Potassium Bichromate	lb.	.14
Potassium Bitartarate (Cream of Tartar)	lb.	.31
Potassium Carbonate (Pearlash)	lb.	.10
Potassium Chlorate	lb.	.15
Potassium Cyanide	lb.	.25
Potassium Iodide	lb.	2.25
Potassium Nitrate (Nitre or Saltpetre)	lb.	.10
Potassium Permanganate	lb.	.17
Potassium, Red Prussiate	lb.	.60
Potassium, Yellow Prussiate	lb.	.24
Potassium Sulphide (Liver of Sulphur)	lb.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	lb.	.70
Pumice, Ground	lb.	.05
Quartz, Powdered	lb.	.01
Rosin, Yellow	lb.	.04
Sal-Ammoniac, see Ammonium Chloride		
Sal-Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Fine	oz.	.51⅜
Silver Nitrate, crystals	oz.	.50
Soda-Ash	lb.	.05
Sodium Biborate, see Borax.		
Sodium Bisulphite	lb.	.15
Sodium Carbonate (Sal-Soda), crystals	lb.	.02
Sodium Hydrate (Caustic Soda)	lb.	.05
Sodium Hydrate (Caustic Soda) by Alcohol (in sticks)	lb.	.45
Sodium Hyposulphite ("Hypo")	lb.	.04
Sodium Metallic	lb.	.90
Sodium Nitrate	lb.	.05
Sodium Phosphate	lb.	.09
Sodium Silicate (Water-Glass)	lb.	.04
Soot, Calcined	lb.	.15
Spelter, see Zinc		
Sugar of Lead, see Lead Acetate		
Sulphur (Brimstone), in lump	lb.	.05
Tin Chloride	lb.	.43
Tin, Metallic	lb.	.30½
Turpentine, Venice	lb.	.35
Verdigris, see Copper Acetate.		
Water Distilled	gal.	.15
Water-Glass, see Sodium Silicate.		
Wax, Beeswax, yellow	lb.	.45
Wax, Carnauba	lb.	.70
Whiting (Ground Chalk)	lb.	.02
Zinc Carbonate, dry	lb.	.12
Zinc Chloride	lb.	,12
Zinc, Sulphate	lb.	.06
Zinc (spelter)	lb.	.06

THE BRASS WORLD AND PLATERS' GUIDE

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Advantage of Thick Furnace Linings.

Brass melting or annealing furnaces with thick fire-brick linings are not only economical in fuel consumption, but agreeable to use. Furnace builders now generally appreciate this fact and are constructing their furnaces with linings thicker than it was formerly considered necessary to make them.

Those who have had experience in brazing, know how difficult it is to heat a piece of steel or iron to the brazing temperature in the open air by means of a blow-pipe. It is also almost impossible to melt a piece of brass of reasonable size in the same manner. When fire brick or any similar non-conducting material is placed around the blowpipe flame, however, not only brazing can be done, but the brass may be melted without difficulty. The cause of the change in temperature is on account of the confining of the heat and preventing its dispersion. In confining the heat, however, two features are involved:

1. Dispersion of the flame and heat.
2. Radiation of the heat.

The difference between the dispersion and radiation may be appreciated if thin asbestos is used instead of fire-brick for confining the blowpipe flame in brass according to the preceding suggestion. While the heat obtained is much greater than when nothing at all is used for confining the flame, it is much less than it is possible to obtain by employing fire brick for confining it. The thin asbestos con lines the flame but is not sufficiently thick to prevent the radiation of heat from its outside. On the other hand, the thick fire brick prevents it without difficulty and allows the maximum temperature to be obtained.

The same is true in melting and annealing furnaces. This fire-brick linings allow much heat to be radiated with the result that, not only is the fuel actually wasted, but the exterior of the furnace becomes heated to such an extent that its operation becomes disagreeable. The ideal condition in melting or other similar operations, would be the complete confining of the heat within the furnace itself, but this, of course, is difficult to carry out in actual practice. By the use of a thick fire-brick lining, however, a good approximation is obtained.

The Increasing Use of Bright Silver Deposits on Flat-Ware.

The use of a bright silver deposit on flat ware is rapidly increasing and many flat-ware concerns are now employing it for the greater portion of their work. Many of the large flat-ware manufacturers have been using it for a number of years.

The reason for its increasing use is that it saves one operation in finishing the flat ware, viz. that of scratch brushing. It is also quite satisfactory on fancy designs upon which the scratch brush cannot smooth up the background. In addition to these features, the silver deposit from a bright solution is considerably harder than the regular deposit and it is expected that a greater wear can be obtained from goods upon which it has been deposited.

As yet we have not heard of any complaints in regard to the bright silver. It is usually believed that it tarnishes far more rapidly than a regular deposit and this would seem to militate against its use. Beyond this, there would seem no other objections. Indeed, the tarnishing property is one that could scarcely be noticed by a purchaser of flat-ware for it is expected that silver will tarnish readily.

The use of bright silver on flat ware has been carried on in England for many years so that it really presents nothing new. Although the operation of scratch brushing would naturally seem to be of little importance, and its cost is low when a single piece is considered, yet its elimination means a yearly reduction in cost of a considerable amount.

Necessity of Hoods Over Hot Cyanide Solutions.

The increasing use of hot cyanide copper solutions and hot electric cleaners in which cyanide is used, has created a necessity for calling attention to the need of suitable exhaust hoods over tanks containing them. Many establishments, in which such solutions are used, have realized the necessity for the hoods and have installed them, while others have paid no attention to it and the employees of the plating room have paid the penalty.

When cyanide solutions are heated, the potassium cyanide therein is much more rapidly decomposed than when cold. Hydrocyanic acid is given off, together with steam. If one doubts this fact, let him stand over a hot copper solution and he will fully realize that the evolution of hydrocyanic acid gas is considerable. It is particularly true in large establishments in which quantities of work are daily turned out, and in which the amount o solution is considerable.

The best form of hood is one made of wood, well painted and pitched, although galvanized iron can be used. The hood should be connected with an exhaust fan wherever it is possible as the fumes are then removed in a positive manner.

The installation of such hoods will greatly improve the health of the plating room operatives, and when hot cyanide solutions are used, is almost a necessity.

According to Consul G. H. Scidmore of Kobe, Japan, the present price of copper (about $300 per ton) is sufficient to give a good margin of profit to the majority of Japanese copper mines. A leading Japanese copper company states that the present minimum cost of production of Japanese refined copper is about 20 yen per 100 kin which is equivalent to $108.67 per ton.

The Process of Sherardizing with Notes on Other Galvanizing Methods.

By J. H. Burn-Murdoch[*]

Previous to the discovery of Sherardizing, there were, practically speaking, only two methods of rust-proofing iron and steel, namely hot-dipping and electrogalvanizing. Both of these processes, however, suffer from serious disadvantages of which, among others, the following may be mentioned.

In hot-dipping, the articles are dipped into a pot of molten zinc, the melting point of which is 786° F. In order to make up for the cooling effect, however, of constantly dipping large masses or quantities of iron into the pot, it is as often as not heated up to nearly 900° F., or a little short of a red heat. To prevent warping and breakage through uneven expansion, the articles must be gradually heated to about the same temperature as the molten zinc. This, of course, if thoroughly and properly done, adds to the expense, and while theoretically easy to do, it is, in the case of large, heavy castings, not easy to carry out in practice. After dipping, the articles are quickly cooled off with cold water to prevent the atmosphere oxidizing, or as it is called, "perishing" the thin coating of zinc. In the case of large articles, especially those of cast-iron or steel, such severe treatment almost invariably causes warping or breakages, so much so indeed is this the case, that hot-dip galvanizers, as a rule, only undertake such work at the owner's risk.

Besides this, it is undoubtedly one of the chief causes of what is known as "rotting," i.e. the quality of the metal so treated is more or less deteriorated, and the grain [illegible]

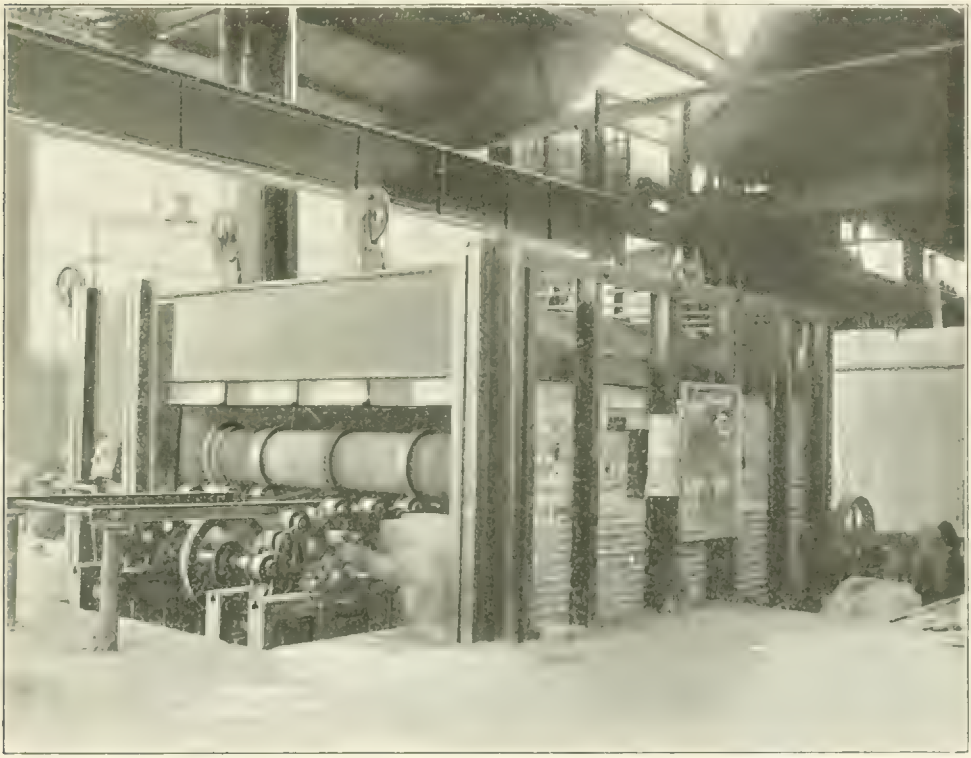

Fig. 1. Sherardizing Furnace of the National Metal Molding Co., Pittsburgh, Pa. Showing the Open Furnace. Capacity, 20 Tons of Conduit Pipe Per Day.

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[*] Process Superintendent of the U. S. Sherardizing Co., New Castle, Pa.

rendered coarse, crystalline and brittle. Thus bolts and similar articles, which have to stand strains, are liable to break at tensile strengths considerably less than they would have stood had they not been galvanized.

As can be readily understood from the foregoing sketch of the hot dipping process, the human element is a great factor throughout so that with the variations in pickling, or cleaning of the articles previous to dipping as well as in the actual dipping, this "rotting" is a very variable quantity, and not such as can be actually calculated and allowed for in advance. On important structural works therefore, where money, as well as life and limb are staked on the work to stand certain strains, architects and engineers cannot safely make use of hot dipped steel or iron on account of this "rotting" defect. Another great objection to the process is, that owing to capillary attraction, the molten zinc has a great tendency to fill up bolt-holes, screw-threads, and corners generally, and these have to be cleaned out afterwards. In the case of bolts and nuts especially, this defect alone debars the use of hot dipping of thousands of tons annually in the United States, as even apart from the rotting defect already mentioned, the cost of re-tapping bolts and nuts is a serious item of expense and, what is worse, this re-tapping removes too much of the zinc coating so that, after all the various treatments which the bolts have gone through, the most important parts, namely the threads, no longer remain rust-proof, but on the contrary, they are the first to get rusty, while the nuts become so rusted on to the bolts that it is frequently a case of cutting the bolt through in order to get the nut clear. To a certain extent, manufacturers overcome this difficuty by dipping the blanks and rolling the threads on afterwards; but it is not fully satisfactory, nor does it overcome the "rotting" defect, while the rolled thread only covers to a small extent the demand for all sorts and sizes of really rust proof bolts and nuts.

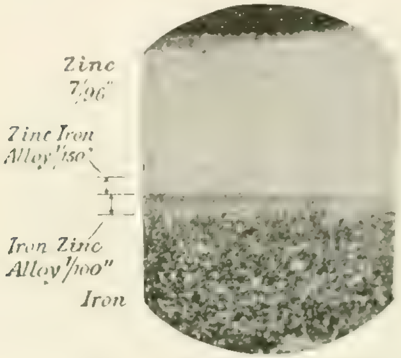


Fig. 2. Microphotograph of Sherardized Surface Magnified 12 Diameters.

In electrogalvanizing, the quality and elasticity of the articles remain unaffected, but the current consumed per foot of surface covered, and weight of zinc deposited is a matter of considerable expense. While in the case of intricate and irregular shaped articles, it is impossible to get the depositing anodes to conform regularly to the contour of the surface to be coated. Consequently, the coating is not only uneven as to thickness, but it is also irregular as to density, that is to say, it is more porous in parts than in others.

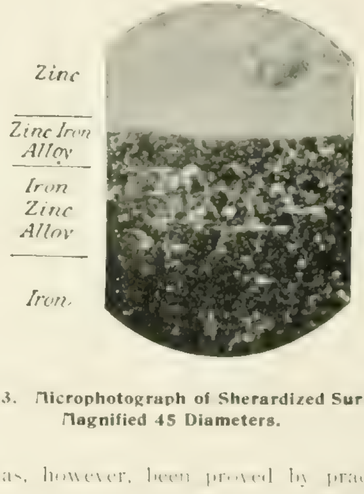


Fig. 3. Microphotograph of Sherardized Surface Magnified 45 Diameters.

It has, however, been proved by practical weather tests, that no matter how carefully the voltage and amperage of the current may be regulated, the resultant coating of zinc is always more or less porous and spongy, and absorbing water as it does, will not render articles rust-proof for any length of time. It must be clearly born in mind that in both these processes, the coating of zinc is merely superficial, and that it in no way combines with the metal underneath and it is in this, one of three particulars, that Sherardizing as a rust preventitive so completely and radically differs from all others.

It is not absolutely perfect or fool proof, but as will be gathered from the following sketch of the process as now carried out by some of the more important firms in the United States, England and Europe, it is both scientifically and commercially speaking, the most efficacious method of rust-proofing iron and steel that has yet been discovered, while as a metallurgical study, it opens out the way to further research on similar lines.

Articles to be Sherardized are first cleaned in any of the usual ways, such as pickling or sand-blasting. Such cleaning operations depend greatly upon the class of work and the quality of the metal under treatment. They are then placed inside iron boxes or drums along with sufficient zinc dust to completely cover them. The drums are then closed up with dust-proof covers, not necessarily air-tight, and gradually heated up in ovens. As a general rule, they are meanwhile slowly revolved or oscillated in order to insure proper contact between the articles and the zinc dust. The dust being a poor conductor of heat, it is almost impossible, except through gross carelessness, to warp or break articles through heating them too rapidly.

The drums having remained in the ovens until the necessary Sherardizing temperature has been obtained throughout, are then withdrawn and allowed to cool down slowly before opening. Here again the human element is eliminated as the poor heat conductivity of the zinc dust absolutely prevents any chance of the articles being too rapidly cooled down. Consequently the risk and warping and breakages through uneven stress are reduced to a minimum.

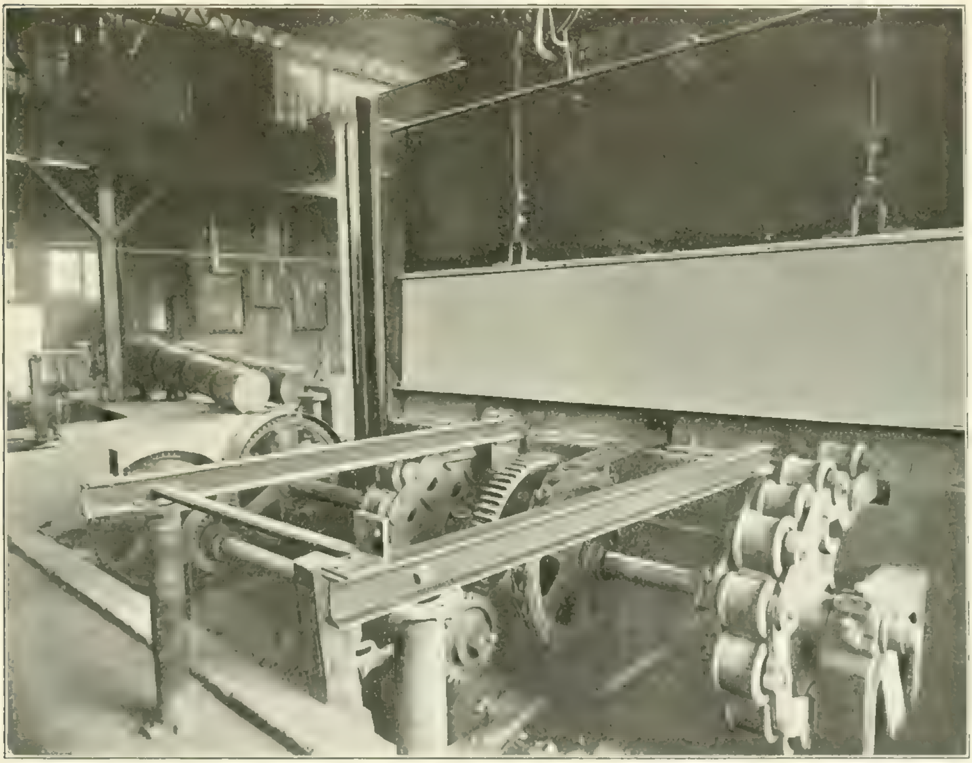


Fig. 4. View of the Closed Sherardizing Furnace of the National Metal Molding Co., Pittsburgh, Pa. Containing Charge of Conduit Pipe.

The maximum temperature required to obtain a perfect rust-proof coating on ordinary rust proof articles being well under 750° F., their metallic properties are not appreciably deteriorated and in most cases, as will be explained later on, they are considerably improved. High tempered and fragile articles are, of course, done at a much lower temperature. It will be noted that the maximum temperature, 750° F., is far less than 800° F. the low the melting point of pure zinc. Bearing in mind that this may be questioned, I have placed this maximum temperature as a safe one. As a matter of fact, however, I may mention that a short time ago, I Sherardized some thirty or forty thousand electrical fittings, and at no single moment could a piece of pure zinc be melted in the hottest spots of the furnace. Seeing therefore that, owing to the non-conductivity of the zinc-dust, the inside of the drums would be much less than the furnace heat right over the flames, I fancy that the actual inside heat could not have been much more than 700° F.

On opening the drums, the articles therein are found to be completely covered with an even, homogeneous coating of metallic zinc. On examining the threads of a cut, Sherardized bolt and nut, they are found to be clean and sharp to the touch, nor is any part of the bolt found to be uncoated, while the nut screws on easily and accurately without any further treatment whatever. In a like manner a piece of the finest mesh, steel gauze will come out perfectly coated and without one single hole having been stopped up, while one's name, previously scratched on a piece of sheet iron with a knife point, will come out clean and sharp; and even more wonderful, a close coiled spring will come out unmatted and not only coated on the outside and inside of the coil, but also rust-proof between each individual spiral as well, notwithstanding the fact that the spirals had been in close and hard contact with each other during the process of Sherardizing.

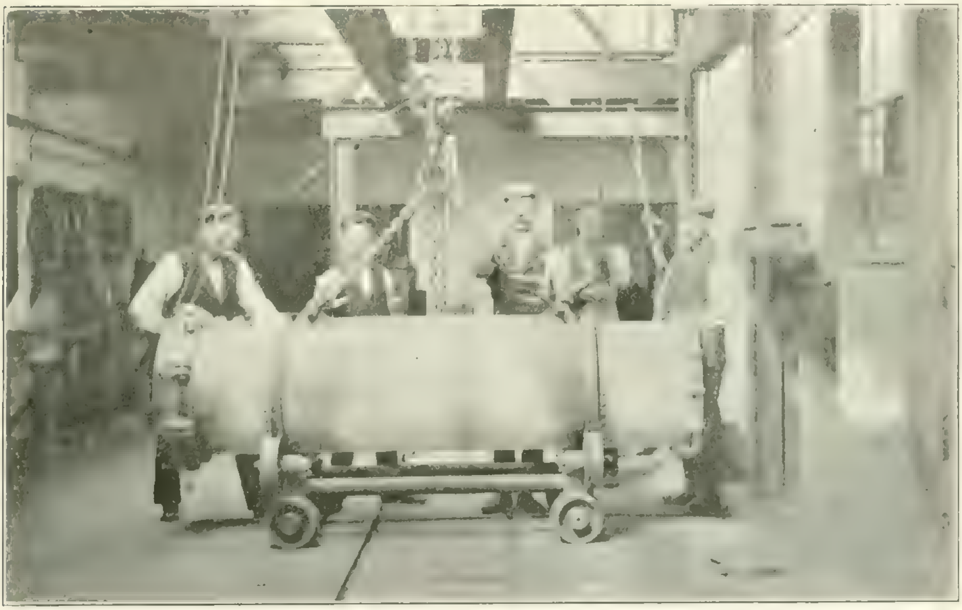
On examining sections of Sherardizing steel rod with a microscope, as well as testing them by chemical analysis, it was found that the zinc penetrated into and alloyed itself with the surface of the steel. At depth, to use a mining term, the percentage of zinc is very small indeed and corresponds, as it were, to the deepest and finest roots of a tree. Near to the surface, the percentage of zinc increases until it reaches a maximum just about level with the original surface of the steel, and above this it gradually loses its character as an alloy and becomes pure metallic zinc. It is thus seen that not only has an alloy been formed, but even more curious, there has been a transposition of steel particles. This alloy, which is not formed in any galvanizing process, is the "Crux" of the whole question, and is really the key and answer to many of the questions and criticisms that have been thrown at Sherardizing.

In the first place, it is obvious to the uninitiated that any coating so fastened or rooted into a piece of steel or iron, must be harder to remove mechanically than a coating that has been simply melted or soldered, as it were. Hence its superiority in that respect. Secondly, (though this may not be so generally thought of) having formed an alloy of steel and zinc, it becomes subject to the chemical law that no chemical agency will so rapidly attack the combined metals as it will do if allowed to act separately. As for instance, Tobin-bronze or similar alloys. The Sherardizing alloy, therefore holds its zinc from such separate attack and the question resolves itself into a more or less non-corrosive alloy, firmly rooted to and entirely covering a corrosive core.

It may be opportune to emphasize here that the whole question of protecting iron or steel from rusting by means of a coating of zinc, is an electrical one and is based on exactly the same principles that are found in an ordinary electric battery. The iron and zinc form the negative and positive elements of an electrical couple, while the atmosphere, always more or less damp and impure, acts as the exciting medium. So long, therefore, as the iron is more or less covered with zinc, it corrodes but little as it is saved from corrosion at the positive zinc element's expense which is oxidized by the damp atmosphere. In addition to this principle, though it can be considered as part of it, is the fact that the oxidized zinc is precipitated on the surface of the zinc proper in the form of more or less insoluble salts which mechanically polarize all further action until a heavy wash of rain removes them.

So the process goes on until all the zinc is consumed and the iron is left unprotected when, as is the case with hot dipping or electro-galvanizing, corrosion rapidly eats into it. With Sherardizing, however, instead of only two elements, we have three, namely, the iron or steel, but in itself negative to the pure zinc. The iron, therefore, is doubly protected from electrolysis, as not until the outer coating of pure zinc has been decomposed, and again until the alloy has in its turn been decomposed, can the iron be materially affected by the weather.

As a practical demonstration of this, I had sixty feet of light, steel jack chain cut in half. One half was carefully hot galvanized by one of the best firms near London, (a specially heavy coating being laid on) while I Sherardized the other half with our ordinary half ounce to three-quarter ounce coating. Both pieces were hung side by side in a five mile tideway in the North of Scotland for nine months. They were then taken out, and on examination it was found that the zinc had been almost entirely removed from the hot dipped chain, and every third or fourth link was more or less eaten through with rust and generally speaking, the chain was quite rotten and useless. The Sherardized chain was somewhat blackened but showed no single trace of wear and tear, nor could any rust be detected. In this case it was evident that, though the sea water had removed all the outer coating of zinc, and bared the chain right down to the alloy, the alloy had retarded, if not permanently stopped, any further electrolytic action and so prevented the steel proper from rusting.



An English Sherardizing Furnace, Showing Drum Containing 2800 lbs. of Bolts. Total Weight 6600 lbs.

As with electrogalvanizing, only to a much more marked extent, Sherardizing shows up any flaws that may be in the steel. This might be considered a disadvantage by those who want to get rid of second class work, but where quality, as well as quantity is considered, it is of great advantage both to the manufacturer and consumer. For instance, the writer has several times Sherardized what appeared to be absolutely perfect and flawless steel bridles and similar articles which afterwards showed faint black lines around the welds, proving at once, and before any more money had been spent on them, and before any accident had happened to the purchaser, that these articles could not be depended upon. The flaws could not be seen even with a strong magnifying glass. The same goods, electrogalvanized, nickel or silver plated would have gone out as sound.

Werner Von Bolton of the Siemens & Halske Co., of Berlin, Germany has devised a process of making tungsten wire by packing finely powdered tungsten in a tube of nickel steel, exhausting the air in it, and then heating in an electric furnace to the melting point. The fused tungsten may then be drawn into wire. It is used for the filaments of incandescent lamps.

A New German Method of Lacquering Brass Bedsteads.

In the *Daily Consular Report*, Oct. 20th, United States Vice Consul W. Washington Brunswick of Chemnitz, Germany describe an improved method used in that country for lacquering brass bedsteads and for which greater degree of permanency and economy are claimed than have previously been obtained:

Formerly the method was to heat the brass tubes in an oven and then apply the lacquer. In the new method the tubes are placed in a lathe and adjusted and turned by hand or power. The main point is that the tubes while rotating are heated electrically and the heating can be regulated as desired. The lacquer is applied while the tube is rotating, and in this way several layers of lacquer can be applied in a short time, as the electrically charged tube dries the lacquer almost as fast as applied. Formerly a composition of shellac and spirits made from rye was used. The tubes are usually thin and possess a large surface for heating purposes in proportion to their volume, so that the tubes only retain the heat a short time and rapidly cool off. In the old method the tubes were heated in an oven, had to be quickly taken out and the lacquer applied, then again placed in the oven remaining there from 10 to 30 minutes, and then another coating was applied. It was important, after the first coat had been applied, to see that no alcohol remained on the lacquered part, so that it would not soften the next application. By the quick evaporation of the alcohol the warm tubes soon became cool and had to be reheated before a new coating could be applied. In consequence the lacquerer must work rapidly, and even then the coating may be defective; and this method required from three to six coatings of lacquer, with the corresponding number of reheatings. The time required for finishing a brass tube was from 1 to 1½ hours, depending on the length and size of the tube and the number of coatings desired. Other methods in use also possess many drawbacks

The new method requires only a minute for giving a tube several coats of lacquer, since the heating and lacquering form only one continuous process, and no cooling or reheating is required. In other words, the cooling of the tubes, caused by the evaporation of the alcohol, is counterbalanced by the electric heating of the tubes during the process of lacquering. A steady, even heat can be maintained in the current flowing through the tube inspite of the cooling effect of the evaporating alcohol. By this new method the tubes do not have to be heated above a temperature of 160 centigrade (288 Fahrenheit), so that there is no waste of heat, as is the case in reheating in the oven.

Another advantage is that the color of the lacquer does not suffer on account of superheating, as in the old method. The economy in space is also an important factor to be considered, as the ovens and working tables required much space. Now the tube is simply adjusted to the lathe and the current turned on; then all dust that may have accumulated during the heating is wiped off, the tube rotated, the lacquer applied, and the finished tube removed and placed in a rack, the entire process requiring only from 45 seconds to 2 minutes.

Hartmann's Aluminum Solder.

A mixture for a solder to be used in soldering aluminum has been patented by Geza Hartmann of the Hartmann Aluminum Solder Co. of New York City (U. S. Patent 938,422, Oct. 26, 1909). It consists of the following:

Tin	80.0%
Aluminum	17.0%
Magnesium	2.3%
Nickel	0.7%

It is stated by the inventor that a clay crucible is necessary for melting. The aluminum and magnesium are first melted together and the nickel, melted in another crucible, is added to this mixture. The tin is then added.

A novel method of soldering has been patented in which the heat is obtained by mixing the solder with some chlorate of potash, nitrate of strontium and shellac. When this is burned, as may be easily done by igniting it, sufficient heat is generated to melt the solder. Soldering iron or torch is unnecessary when used. It is applied more particularly to soldering electrical connections

Some Experiments on the Electrodeposition of Green Gold.

When well done, a green gold deposit is a very pleasing finish, but the value of it invariably depends upon the color. Unless the right shade is produced, the article will have the appearance of yellow brass. A good green deposit, however, possesses a shade peculiarly its own and is not approached by any other finish.

Green gold is produced by the use of a small quantity of silver with the gold. When the silver is present in an amount of from 20 to 25 per-cent, the shade of the gold is changed from a yellow to a green. A good proportion is 4 parts of gold and 1 part of silver, although it does not seem to matter much about the exact proportion. If too much silver is used, the gold then takes on a whitish shade. Some platers use the gold and silver in the proportion of 3 and 1, while others use as high as 5 to 1. In the following experiments, the varying proportions of gold and silver were tried, and practically no difference in the shade could be detected. In this respect, the solution seems to act like a brass one as it is well known that the proportions of copper and zinc in it need not be exact in order to obtain a desired color. The amount of free cyanide and strength of the current are the factors that bring about the desired shade.

For the green gold solution used in the following experiments, one used in a number of establishments for coloring was employed. It was made up as follows:

Water	1 gallon
Yellow Prussiate of Potassium	10 oz.
Potassium Carbonate	4 oz.
Sodium Phosphate	4 oz.
Potassium Cyanide	1 oz.
Gold and Silver (4 to 1)	2½ dwts.

The gold and silver used were in the proportion of 4 parts of gold and 1 part of silver. To make the solution, 2 dwts. of gold were dissolved in aqua-regia and evaporated to make chloride of gold. Then ½ dwt. of silver was dissolved in nitric acid, converted into chloride by precipitation with muriatic acid, after which it was washed with water to remove the free acid.

The different ingredients were dissolved in the water and then the chlorides of gold and silver added. The solution was then ready for use. For producing the "smut" on the deposit an arsenic solution is used, and this will be subsequently described. The first experiments were made upon the solution without the arsenic solution.

Trials without the "Smut"

The solution was first used cold with a platinum anode. A current of 1 volt gave a slight silver deposit around the edges of the article. No gas was given off. At 2 volts, the deposition was quite slow and the color of the deposit not uniform. No gas was given off. At 3 volts the gas was given off from the article freely and a slow deposit obtained. The best current was found to be between 3 and 4 volts. The color was then good and the deposition rapid. When the current strength reached a greater amount so that 6 volts were used, the evolution of gas was quite rapid and the deposit off color. It was found that when the current became too strong, the gold deposit became redder. The best color was obtained at from 3 to 4 volts.

Article Illustrating Application of Smut on Green-Gold Finish.

When the deposit first begins to show, it is dull so that the solution cannot be used for bright deposits without either scratch-brushing or burnishing. After having run for five or ten minutes, the deposit became dull and a longer time gave a dead, matt surface but of a dirty color. In order to obtain a dark, and at the same time dead deposit, the use of arsenic is necessary. Scratch-brushing, read to produce a good lustre on the dead deposits, although they may appear to be almost non-metallic before it is done.

The solution was then heated to about 120 degrees F. and the character of the deposit noticed. Contrary to the usual belief, it is possible to run the solution at this temperature and a good deposit was obtained. It is believed that the solution covers better when warm, and it has been found that some platers are accustomed to run a green gold solution heated.

Unless a "smut" is desired on the work it is advisable not to use the arsenic as the deposit is better without it. The addition of the arsenic was found to give a dark green or black "smut", as may be desired, but not actually to change the color of the gold itself after scratch-brushing unless too much was used when the deposit then became gray. The object of the arsenic is to darken the "smut." It does not seem actually to change the color of the gold deposit itself.

Use of the Arsenic "Smut."

As previously remarked, the object of the arsenic addition to a green gold solution is to produce the dark-green "smut" in the background of the article. This "smut" usually forms the most pleasing part of a green gold finish. When well done, and upon a suitable article, the dark-green "smut" is present in the background, and this gradually shades to the light green and bright deposit on the high-lights. In the illustration is shown an article of this character which is well adapted for the green gold finish.

The arsenic solution for the "smut" was made in the following manner:

Water	2 oz.
Caustic Potash . ..	1 oz.
White Arsenic	1 oz.

The caustic potash is in the form of sticks and should be dissolved in the water. The white arsenic (arsenious oxide) is then added and the whole warmed when it will dissolve. The white arsenic should be powdered as it dissolves more readily. This "smut" solution is kept in stock for adding in small portions at a time to the green gold bath. The effect of successive additions was as follows:

When 10 drops of the "smut" solution were added to the gallon of green gold solutions, it was found that an immediate effect was produced. The deposit became dead more rapidly and the dead deposit was darker although not of a pleasing shade. Increasing the quantity to 20 drops of the "smut" solution, the color of the dead deposit became darker, but it did not have a dark, green color. The shade was more of a dark brown than otherwise. By gradually increasing the amount of the "smut" solution it was found that about 1/3 of an ounce was necessary to produce the dark color desired in the background. When more than this quantity was added, the color became still darker and finally black. If too much of the "smut" solution is used, the deposit is not adherent and easily wipes off. As it is, the "smut" obtained is not hard and is easily removed by the scratch-brush. In making the green gold finish the article should be lacquered after the high lights have been relieved, as the lacquer serves to protect the "smut."

A New Aluminum and Magnesium Alloy.

A new aluminum and magnesium alloy has been patented by Joseph Grenville Mellen of the Auroid Metal Co., Bridgeport, Conn. (U. S. Patent 936,330, Oct. 12, 1909) and which, it is claimed, has many novel features. It consists of the following:

Aluminum	79 %
Magnesium	. 11 %
Phosphor Copper	10 %

The phosphor-copper used contains 99.5 per cent copper and 0.5 % phosphorus.

This alloy is called by the inventor *[illegible]* and is used for making sand castings. It has about the same specific-gravity as aluminum, but is much harder and machines well. It does not clog the file. The inventor claims it is an excellent working metal. The object of the phosphorus, the inventor says, is to prevent the oxidation of the magnesium in melting. When the alloy is melted, therefore, the phosphorus oxidizes in preference to the aluminum. With magnalium, an alloy of aluminum and magnesium, the magnesium oxidizes extensively in melting so that the alloy is changed to a marked degree.

Satisfactory Run of Crucibles In an Oil Furnace.

By Alfred L. Belfield[*]

Referring to the article in THE BRASS WORLD, October, 1909 by T. F. Gourley on "Coke vs. Oil for Brass Melting", there seems to be a wide difference of opinion as to the results obtained in melting brass by means of oil. The writer has had a number of years of experience in melting brass with oil, and he differs very decidedly from Mr. Gourley in the results obtained.

In the first place, there is an economy of space, both in reference to the amount of room taken by the oil furnaces themselves in the foundry, and also in the fuel storage, removal of ashes, etc., which should be taken into consideration as an important factor. The cost of handling fuel for oil amounts to practically nothing, while with coke and coal it is a very considerable item, owing to the hauling or storage of the fuel and the removal of the ashes.

No. 150 Graphite Crucible, which Ran 43 Heats in an Oil Furnace

Our experience has been that we have been able to obtain 43 heats from a No. 150 graphite crucible running four heats per day and with an oil consumption of about 2 gallons to 100 lbs. of metal. The oil costs 2¾ cents per gallon delivered at our works. We, therefore, feel that the cost per 100 lbs. of metal is considerably less than that mentioned by Mr. Gourley.

The writer made at one time, 40,000 castings weighing about ¾ lb. each and which were finished on the inside and outside. The loss on this order was less than one per cent. In our shop the average loss is less than two per cent and we finish all the castings which we make and very few are sent away in the rough state. We have made work that has been inspected and a chemical analysis made of it, and in all cases the analysis has held up to the required specifications, showing there is no deterioration in the melting in oil furnaces, at least as far as our own experience goes. We do not find that there is any perceptible difference at any time in the working of our castings in the shop, and we are, as previously mentioned, making the castings every day in the same manner.

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[*] Bridgman Bros. Co., Philadelphia, Pa.

We melt a great deal of light, yellow brass and the castings made from it are finished all over. One customer that we have, and for whom we have made thousands of dollars worth of finished material out of these yellow brass castings, rarely finds any of them defective. The color is uniform and we feel that the results are very gratifying and under no circumstances would we go back to coke furnaces.

The crucible herewith illustrated is a No. 170 and stood 43 heats in an oil furnace without showing the difficulty illustrated by Mr. Gourley. It is worn down so thin that it will hardly hold the metal so we feel that we obtain their full value from them especially when our average of heat is as high as it is. Of course, these results are obtained by care and close attention to the application of the method of melting with oil, and we do not believe we are any more successful than anyone else. We do feel, however, that we should take exception to Mr. Gourley's articles as evidently his experience is far from being the same as our own.

This article has been written more with the object of bringing out any further information from brass founders who may have had the same experience as our own; or to clear away the wrong impression made by Mr. Gourley's article which, no doubt, has been formed by many people.

New Books.

METAL SPINNING, by F. D. Crawshaw M. E., Popular Mechanics Co., Chicago, Ill. Price 25 cents.

This is the first book published in the English language on metal spinning. In spite of its price it is an excellent little treatise on the subject and is bound in cloth. It contains 80 pages and 33 illustrations showing the various stages in spinning operations. The book is well written and contains much information for those interested in the subject. It is well worth the price.

New Process of Making Titanium Alloys.

Titanium is one of the most interesting of the so-called rare metals for the reason that it is, in reality, one of the most common. Enormous deposits of titanic iron ores occur in many localities, which have not been worked as iron ores on account of the presence of titanium in them. It has always been customary to speak of titanium as a rare metal on account of its cost and the fact that it is seldom found in the metallic state or rarely used. Common element that it is, there is a strong probability that the future will find it extensively employed for many purposes. At the present time, however, uses for it sufficient to warrant it being produced on an extensive scale have not been found.

A. J. Rossi of the Titanium Alloy Mfg. Co. has, for many years made a study of titanium and has done much to increase our knowledge of the subject. In a patent recently issued, (U. S. Patent 935,863, Oct. 5, 1909) the manufacture of various titanium alloys is claimed. The alloys of tin and titanium, lead and titanium, zinc and titanium, and manganese and titanium are the ones particularly mentioned and are made in the following manner:

A mixture of titanic acid, the oxide of the metal used as the remainder of the alloy, (such as oxide of tin, for example,) some of the metal to be alloyed with the titanium, and a quantity of aluminum in the form of small flakes or shot is made. This is placed in a graphite crucible with some glass for a flux and the whole heated in a furnace. As soon as the heat is sufficiently high, the reaction sets in and the aluminum reduces the titanium from its oxide, the so-called titanic acid, The quantity of aluminum used must be just sufficient to reduce the oxide of titanium and no more, otherwise some of it would enter the alloy.

The alloys are useful, the inventor says, for removing the gases from molten metals. It is well known that nitrogen is far more dangerous when present in metals than previously supposed, and titanium, having a strong affinity for it, will probably serve to remove it in an effectual manner as well as to act as a deoxidizer.

A New Method of Producing the Verde-Antique by the Use of the Current.

By A. Bider.

The following method of producing the verde-antique finish in brass, bronze or copper will be found satisfactory. It is used with the electric current and, therefore, may be rapidly done. It gives a dark verde of much beauty and is simple in operation. I have used it for several years with the best of results, and work that was finished by means of it some two years ago and not lacquered or even waxed, is now in as good condition and has as rich a color as when first done. The solution used is made up as follows:

Water	1 gallon
Potassium Bi-chromate ...	12 oz.
Copper Sulphate	3 oz.

The potassium bi-chromate and copper sulphate are dissolved in the water and the solution is then ready for use. Hot water dissolves them more rapidly than cold, but the solution itself for producing the verde-antique is used *cold*.

The work to be given the verde-antique finish by the solution is first cleaned in the regular manner from grease, and may either be left bright or sand-blasted. The solution seems to work well in either instance. Contrary to the usual practice with other finishes of this kind, sand-blasting is unnecessary as the verde can be produced equally as well on a polished surface.

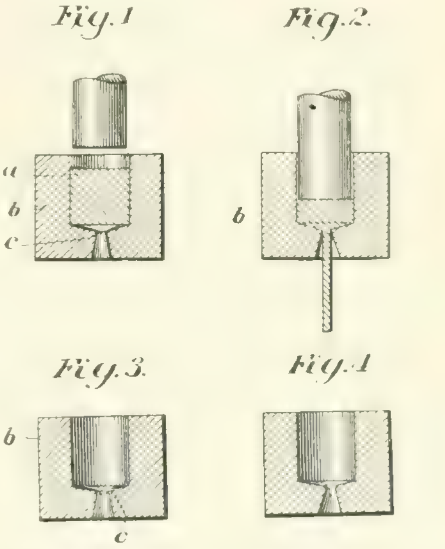
The solution is used *cold* and the work to be given the verde is used as the *cathode* as in the regular plating operation. The anode may consist of a sheet of brass or copper. Brass gives good results.

A rather strong current is necessary for the rapid production. The full 6 volts of a plating dynamo, therefore, may be used and then the verde forms rapidly. At first a brown stain is produced, after which a green makes its appearance. Now remove the article and rinse in water, dry and relieve if desired. Remember that the article is used as the cathode. I believe this solution will be found very satisfactory to those who use it.

Cadmium is now used in gold and silver solders for lowering their melting points.

A Method of Greatly Increasing the Strength and Toughness of Zinc.

A method of greatly increasing the tensile strength and toughness of zinc has been patented by Salomon Frank of Frankfort-on-the Main, Germany, (U. S. Patent 935,900, Oct. 5, 1909). By the process he claims that the tensile strength of commercial spelter, which ordinarily is 120 lbs. per sq. in (8 kilos per sq. cm.), may be raised to 29,000 lbs. per sq. in. (2,000 kilos per sq. cm.). The ductility is also raised from practically nothing to from 26 to 70 per-cent. The manner of doing it is as follows:



Frank's Method of Making Zinc Rods of High Tensile Strength.

The zinc is placed in a die of cylindrical shape, similar to one used for making lead pipe, and a pressure of 60,000 lbs. per sq. in. is given it by means of a punch operated by a hydraulic press. At the same time the zinc is heated to a temperature of from 90 to 180 degrees F. This temperature must be maintained within these limits in order to obtain the increased tensile strength. The inventor states that the temperature usually employed in rolling or working zinc, [illegible] to 300 degrees F., will not answer for this process. The zinc will not then have the increased strength or ductility.

In the illustration the manner of pressing through the die is shown. The inventor states that the opening of the die is an essential feature of the process. This opening should have a sharp edge c as shown. The zinc z is then issued from the die without undue heating. Care must be taken in pressing the zinc not to overheat it by unduly increasing the speed at which it issues from the orifice of the die.

The inventor claims that the structure of the zinc is entirely changed by the treatment so that it becomes very finely crystalline and strong and tough. In this respect, he says it closely resembles brass and for which it may be substituted in many cases. As an explanation of the phenomenon that takes place when the zinc is pressed in this manner, the inventor believes that it changes its character so that a new and hitherto unknown "allotropic" form of the metal is produced.

"Patchy" Silver Deposits.

Silver platers are often confronted with a so-called "patchy" deposit on their work. When it occurs, the work has bright spots on it while it is dead in the others. It usually is quite a problem to solve when its elimination is taken into consideration.

The cause of the patches is the presence of sulphur in the solution. How the sulphur enters the solution will have to be left to the plater but it may be said that the use of rubber on the racks, rubber compounds for lining the tanks or introduction of a bright solution will frequently bring the patches on the deposit. All rubber contains more or less sulphur.

As far as known, there is no satisfactory method known for reclaiming the solution when it works in this manner except to use it, if possible, until the sulphur has worked itself out. In one establishment, of which we recently heard, the silver solution gave a "patchy" deposit on account of the use of hard rubber on the racks, and the problem was carefully considered from all sides when it was decided to change it over to a bright solution by the addition of bi-sulphide of carbon. It seemed to be the only solution of the problem.

Correspondence.

Cost of Melting with Oil.

Editor:

I have read with interest in the October issue of The Brass World the article by T. P. Gourley on brass melting with oil and coke. While I do not question the statement of Mr. Gourley that his cost is 18 cents per 100 lbs. of metal, it set me thinking about our own costs and I had our book keeper make out the following cost report for six months of this year with oil against six months of last year when we used coke for melting. It will be noted that we have saved more money by using oil instead of coke.

For the first six months of 1908, our cost of coke, crucibles, lining, etc. was $1,918.45 for melting 632,999 lbs. of metal. For the first six months of 1909, our cost for oil, crucibles, lining, etc., was $642.59 for 609,226 lbs. of metal melted. It will be apparent, therefore, that the following comparison can be made:

Cost of Melting with Coke 30.3 cents per 100 lbs.

Cost of Melting with Oil 10.5 cents per 100 lbs.

It may be of interest to say that it is necessary to know how to use oil in melting in order to obtain good results.

G. A. [illegible], President
The Lumen Bearing Company
[illegible]

An Acid Resisting Coating for Iron and Steel.

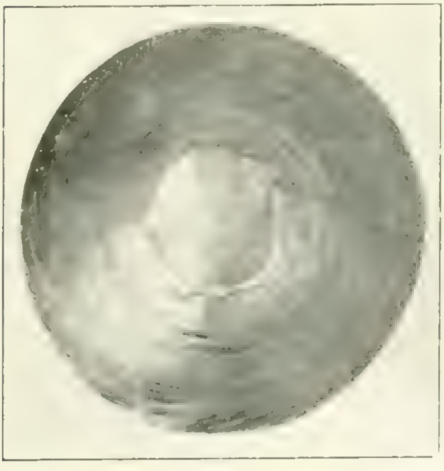
A new method of coating iron or steel to resist the action of acids has been patented by Geo. F. Allen of the Hoyt Metal Co., of St. Louis, Mo. It consists in first making an alloy of lead and zinc containing from 0.25 to 3 per cent of zinc. The iron or steel is coated with this alloy by dipping the article into it while melted. A second coating of pure zinc is now applied to the article by the usual dipping process, after which an alloy containing from 10 to [illegible] per cent of tin and the rest lead is applied by dipping as before. Three layers, it is claimed, are thereby produced which form a protective coating for the iron or steel article.

Fire-Cracks in Brass Kettles Made in Former Times.

A brass kettle, or rather the beginning of one, was recently found by Willis Wooster of Torrington, Conn., while working on the site of the old Warrenton Woolen Company's dam. The kettle, which is illustrated in Figs. 1 and 2, is practically half made. The partially made kettle is now in the possession of Nathan A. Tuttle of Torrington to whom it was given by Mr. Wooster. We are indebted to Mr. Tuttle for the photographs and the information concerning the kettle.

Side View of Old Hammered Brass Kettle, from Torrington.

The kettle was apparently lost in some manner during the time of Israel Coe, the founder of the present Coe Brass Mfg. Co. of Torrington, now one of the largest brass rolling mills in the United States. It was found under about four feet of sand and gravel. Mr. Tuttle believes that the kettle was a partially finished one which the employees of Israel Coe had found to be imperfect on account of the fire-cracks in it and had laid it one side. In the early days of the brass rolling mill business, the manufacture of brass kettles was one of the chief industries. At first they were pounded out by hand. Afterwards trip hammers were used. The partially made kettle plainly shows the hammer marks. In the opinion of Mr. Tuttle, the fire-cracks undoubtedly were the cause of its rejection.



Bottom View of Old Hammered Brass Kettle.

It is believed that the kettle is the only relic left of the old days of brass making in Torrington, (then called Wolcottville) or possibly in the United States as Israel Holmes was among the first to manufacture brass in this country. In Orcutt's History of Torrington, the following information is contained which has an important bearing on the finding of the partially made brass kettle.

"The first effort to make brass kettles in America by the battery process was commenced in Wolcottville in 1834 by Israel Coe. The great difficulty that arose was the proportioning or mixing of the metals so as to form a compound that could be subjected to hammering and annealing without cracking, and for some years the company was under the necessity of importing metal ready cast for this purpose. In 1842, Israel Coe went to England and obtained the right materials and mixture, and ever after that the great difficulty was overcome."

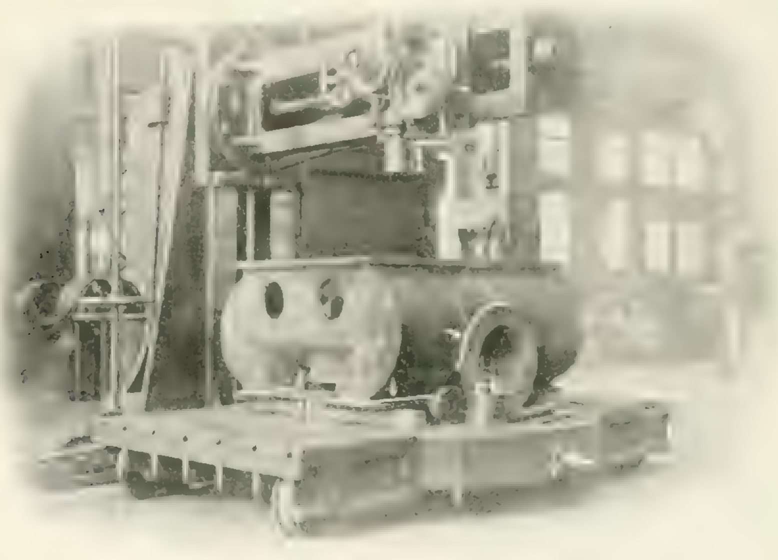
An Improvement in Tinning and Galvanizing.

An improvement in tinning and galvanizing has been patented by Charles J. Kirk of the U. S. Sherardizing Co., of New Castle, Pa. (U. S. Patent [illegible].) It consists in first "sherardizing" the iron or steel articles in the usual manner by tumbling them with zinc dust, and then dipping them in [illegible] as the case may be, to tin or galvanize them.

It is claimed by the inventor that the [illegible] adheres much more tenaciously to the surface when this is done. The coating of zinc that is produced by the "sherardizing" process is so thin that it serves to bind the succeeding coating far more completely than would be [illegible] treatment with the [illegible]

Oxy-Acetylene in Repairing Brass Castings.

That the oxy-acetylene blowpipe is useful in repairing flaws in brass or bronze castings is indicated by the large casting herewith illustrated. This casting, weighing 4500 lbs., was partly machined when large blowholes were uncovered on the flange indicated by the white line and arrow. The Davis-Bournonville Co., 86 West St., New York, undertook to repair the casting and succeeded in melting in a sufficient quantity of brass to make a sound casting of the defective portion. A casting that would otherwise have gone to the scrap heap was made equal to a new and sound one and with small expense. Owing to the high temperature developed by the oxy-acetylene blowpipe, all that was required was the simple melting on the defective part of a sufficient quantity of the same kind of metal to fill the blowholes.



Brass Casting, Weighing 4500 lbs., Repaired by the Oxy-Acetelyne Process of Welding.

While the diamond is the hardest substance known, it is also brittle and may be fractured by a blow. If, however, it is placed between two hard steel faces in a hydraulic press and a slowly accelerating pressure applied, the hard steel will become indented.

Alloys for Use in Place of Platinum for Electrical Apparatus.

Two new alloys for use in place of platinum for spark-points and other portions of electrical apparatus have been patented by Edward B. Craft and Jonathan W. Harris of Hackensack, N. J., and assigned to the Western Electric Co. of Chicago, Ill. (U. .S. Pats. 937,284 and 937,285, Oct. 19, 1909).

One of the alloys consists of the following:

Gold	70.0%
Silver	25.0%
Platinum	5.0%

The three ingredients are placed in a crucible and heated (preferably in an electric furnace) so as to melt them. Several meltings are said to improve the alloy. A graphite crucible lined with magnesia is recommended for melting either of the alloys in order to prevent the absorption of carbon that would take place when a graphite crucible alone is used.

The other alloys consist of the following:

Gold	70%
Silver	25%
Nickel	5%

This alloy is melted in the same manner as the other. It is claimed for both alloys that they possess practically all the characteristics of platinum, as regards non-corrosive properties, but are much cheaper. If over 30% of silver is used, the alloy tarnishes in use. If over 7.5% of nickel is employed, there is also a tendency for the alloy to corrode. When more than 7.5% of platinum is used in the first alloy, the cost is increased and the alloy becomes less homogeneous. The use suggested for the alloys is spark-points, and other forms of electrical contacts. The cheapness is, of course, not particularly marked, but it is much less than pure platinum.

Notes on the Production of Pure Spelter.[*]

By John S. G. Primrose.

The importance of the metal zinc in the manufacturing world to-day may be judged from the fact that the world's output has almost quadrupled itself in the past thirty years, and in that time the British production has increased tenfold. The imports of crude spelter into the United Kingdom now average about 100,000 tons annually, and yet during the last eight years the price has also steadily risen, which shows in a remarkable way the appreciation in economic value of the metal.

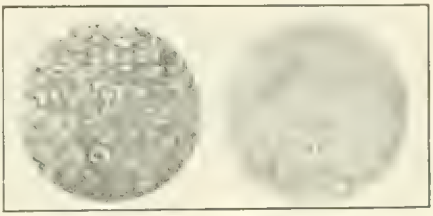
The metallurgy of zinc is one of the most interesting in the whole range of the metals, and in view of the present wastefulness which generally accompanies its production, still leaves scope for research and improvement. It is somewhat curious that its alloy as calamine brass should have been in use for many centuries before zinc was actually separated as an element somewhere in the fifteenth century.

There is almost no other metal which combines so tenaciously with but little more than traces of impurity to form stable alloys, and moreover holds on to them and mechanically carries them with it, even when raised to the boiling point and volatilised. Thus the numerous means which have for long been tried to purify the metal, resulting from the usual distillation process of recovery from its ores and products, fail in so far as they have to deal with a spelter in an already unpurified condition, unless when exceptionally pure ore is available.

Refining Methods.—To even briefly review the methods variously adopted for this purpose would extend far beyond the scope of the present notes, but the underlying principles of the methods may be classified under three headings, viz.:—

1. Segregation or liquation.
2. Redistillation.
3. Electrolytic Separation.

The first-named are still extensively used in the conventional practice on the Continent, particularly in Upper Silesia, when the crude spelter, often holding as much as 3 per cent. of lead, is kept molten at a temperature but little above its melting point in a reverberatory furnace of the type shown in Fig. 1. The heavier zinc-lead alloys fall to the bottom and are periodically removed; overlying this comes a thin layer of highly ferruginous zinc, and the top metal is the comparatively pure zinc, which is ladled out and cast in moulds placed on a rotating table used for casting. The amount of lead retained by the zinc depends upon the temperature maintained, thus at 550° C. zinc will hold up 5.5 per cent of lead quite readily, but at its melting point (420° C.) it will only alloy with 1.5 per-cent, so that even at the powest possible temperature required to keep the metal molten, there is always an appreciable quantity of lead retained.



Microphotographs of Hard Spelter. Magnified 30 and 120 Diameters. Contains 10 per cent Iron.

The second named method is frequently employed in America with regenerative gas fired furnaces, where smelting costs are low, but this still leaves an appreciable amount of lead in the spelter.

The electrolytic methods of which the Siemens process appears to have been the best, have only as yet reached experimental stages, since they are rather costly, although the metal can be produced almost chemically pure, assaying 99.98 per cent of zinc.

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[*] Abstract of a paper read at the Annual Meeting of The Institute of Metals, held at Manchester, England, October 14th and 15th.

These all fail to be efficient or commercially practicable chiefly on account of the fact that zinc possesses so powerful an alloying affinity for other metals and even metalloids, e. g. arsenic, and further it is strongly electro-positive to the contaminations likely to be present.

The following analyses of spelter will show that the chief impurities to be guarded against are lead and iron:

Number	1	2	3
Lead	2.55%	0.66%	0.200%
Iron	0.015%	0.026%	0.004%
Cadmium	0.001%	None	0.007%
Tin	0.005%	0.003%	None

1 Upperbank (English)
2 V. M. G. (Belgium)
3 Vieille Montagne (Belgium)
4 Freiberg (Saxony)
5 Laurahutte (Silesia)
6 Lipine Electrolytic (Silesia)

Number	4	5	6
Lead	1.03%	1.12%	0.006%
Iron	0.004%	0.002%	0.001%
Cadmium	0.02%	0.017%	0.005%
Tin	0.07%	None	0.02%

When iron is present in an amount over 0.10 per-cent, distinct crystallites are present which are discernible under the microscope. They are the cause of the bright specks on the crystal faces of fractured spelter. Photomicrographs of hard spelter containing about 10 per-cent of iron are herewith illustrated, in which the crystals are well marked even at a low magnification.

In view of the large amount of impure zinc cheaply procurable from galvanizers in the form of "ashes", "dross", and "hards", the furnaces as slightly modified were originally started on the refining of these materials, often so impure as to contain from 8 to 10 per cent of iron and from 3 to 8 per cent of lead, the zinc content ranging from 60 per cent upwards. It is a good testimonial to the efficacy of the process that from this material, spelter of the highest grade is regularly produced. Thus "ashes" containing 75 to 80 per cent of zinc yield a first and second tapping of spelter 99.7 pure, "dross" with from 85 to 90 per cent zinc a spelter of 99.8 per cent purity, while the granulated zinc with 90 to 94 per cent of zinc frequently yields 99.9 per cent spelter. Although the "ashes" treated are frequently mixed with flue dust and scrapings, the charge is very dense, but requires a comparatively small proportion of coke to open it up, a moderate percentage of "Breeze" being used[1]

(A large part of the paper consists of a description of the zinc smelting plant, recently erected at Irvine, Scotland by the Brand's Pure Spelter Co. and the author makes the following remarks about the smelting of zinc dross.—Ed.)

On the average about 6 tons of "dross" can be treated daily per furnace, and the practice so far includes several weeks, in which slightly over 30 tons of spelter were produced from No. 1 furnace. The work is carried out as in ordinary smelter practice. Starting with the morning shift at 6 A. M. the spent residues are raked out into the chutes to the tunnel, and the fresh charge is got in by hand shovelling before 10 o'clock. Gradually raising the temperature from about 850° C. to the full heat of over 1100° C. the distillation proceeds rapidly so that about 25 per cent of the yield is got in the first tapping shortly after 4 P. M. The second tap follows about 8 P. M., and the third immediately after midnight; and the final scrapings are collected a little before 6 A. M., when the night shift steps off. In spite of the utmost precautions in lining the ladles and coating the scrapers, &c., there is always a trace of iron present in the spelter, but even when cast direct from the hand ladles, the first two tappings yield plates of the highest grade without remelting, the lead being guaranteed under 0.2 per cent by the registered trade-mark of "IRVO."

An acid proof cement has been recently patented. It consists of from 20 to 30 parts of litharge, 10 to 15 parts of ground quartz, 5 to 10 parts of plaster of Paris, and 1 to 5 parts of lampblack. They are finely ground and then mixed with sufficient glycerine to make a paste of the mass. From 10 to 15 parts of glycerine are used. While the cement hardens, it is said to have a certain degree of elasticity when heated so that it is not apt to crack.

A New Emery Belt Joint.

A novel method of making the joint on an emery belt has been devised by John C. Blevney, 216 High St., Newark, N. J., the well known inventor of a number of polishing machines. This joint was devised more particularly for use on his machines which, as well known, consist of an endless belt of emery cloth running over pulleys. It is necessary, of course, to connect the ends of the belt in some manner so that the pressure of the work upon it while being ground will not tear it up. In the ordinary form of belt, which consists in cutting the strip of emery cloth on the bevel and gluing a strip on the back, the two edges of the cloth are exposed and are easily caught in the work.

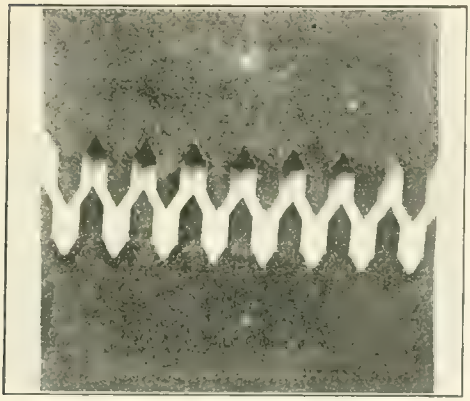

Fig. 1. Manner of Cutting the Emery Belt.

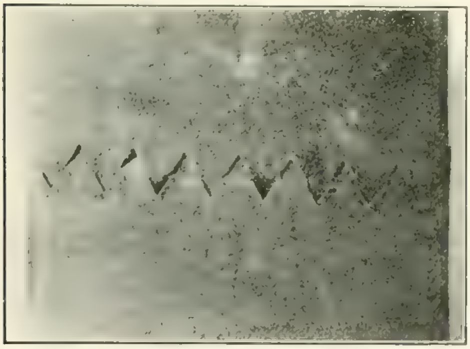

Fig. 2. The Joint on the Emery Side.

The manner in which the Blevney joint is made may be understood by referring to the illustrations. In Fig. 1 are shown the ends of the strip of emery cloth cut by a special form of die. The ends are then dovetailed as shown in Fig. 2 and glue applied, after which the joint is clamped together and a smooth surface left. The ends of the dovetail come on the back as illustrated in Fig. 3. There are, therefore, no ends on the first or working side of the belt to catch in the work being ground. The belt, as employed on the various Blevney machines, is used for grinding and polishing all classes of work.

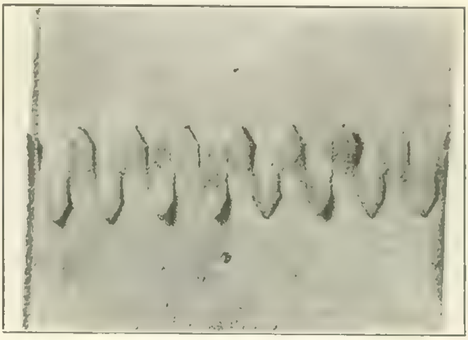

Fig. 3. The Back of the Joint Before Glueing.

A New Zinc Coating Process.

A new method of coating iron and steel with zinc in a process analagous to Sherardizing, has been patented by Carl H. Zieme of New Castle, Pa. It consists in mixing 3 parts of zinc dust and 1 part of wood pulp and applying to the surface of the object to be coated with the zinc. The object is then heated in a retort or tight muffle when the zinc combines with the iron or steel in the form of an alloyed coating. The process is, it is said, particularly applicable to coating steel sheets with zinc. The mixed pulp is placed between the sheets in a pile and the whole then heated.

Fluor-spar to the extent of 38,795 tons, valued at $225,998 was produced in the United States during the past year, the greater part of which was used as a flux in smelting operations. The balance was used for making hydrofluoric acid and in the manufacture of enamels and glass.

The Surface Appearance of Solders.

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By C. O. Bannister, and H. J. Tabor.

It is well known that sales of solder are often influenced by appearance rather than by chemical analysis, and the following are the chief properties taken into account :—

1. Its appearance. It is generally cast in the form of strips, and particular attention is paid to the nature of the surface as to whether it is white or has a yellowish colour, bright or dull, smooth or rough, spotted, pitted or pimply, and whether it has or has not a furrow.
2. Its toughness, and the nature of the fracture.
3. Its hardness
4. Its melting-point.

A good solder, as far as appearance is concerned, should when in the form of strips be white, have a furrow running along the centre, be smooth and free from rough patches, spots, pits, or pimples, and be free from stippling at the ends.

The following are the conditions which affect the appearance of solders :—

1. Chemical composition.
2. The temperature of the metal when casting.

The surface is generally better when the metal is poured hot, but not too hot. Metal which pours spotty may often be remedied by varying the conditions of pouring, &c.

3. The material of which the mould is made, a bad conductor of heat like marble being generally supposed to give a better surface than one made of a good conductor such as iron.
4. The temperature of the mould ; to a certain extent, the slower the metal sets, the better the surface.
5. The thickness of the strips.
6. The use of a cone in pouring or the addition of a little grease or resin.

Effect of Antimony.

The first series of experiments were made in order to examine the effect of small quantities of antimony on tinman's solder, and at the same time to determine the effect of casting under different conditions.

Preliminary experiments were first carried out in a small iron mold giving a strip 3 × 5/16 × [illegible] inches, and in a marble mold giving a strip 4 × [illegible] × 3/8 inches. The experiments were afterwards repeated on a larger scale in full sized molds in the case of the alloys giving the best surface appearance, the alloys being prepared in a crucible in a wind furnace under charcoal. The dimensions of these larger strips were :

In the iron mold : Length, 11 inches ; width, [illegible] inch ; thickness ½ inch.

In the marble mold : Length 16 inches ; width, ½ inch ; thickness, ⅜ inch.

These experiments were carried out with a series of alloys containing 46 per-cent of tin, from 1 to 10 per cent of antimony, and the rest consisting of lead ; and for comparison, an ordinary tinman's solder containing 50 per-cent tin and 50 per-cent lead was used. The bars of solder were nicked, fractured, and the fracture examined.

The solder containing no antimony was tough and gave a silky fracture. That containing antimony was not so tough and was very finely crystalline, this crystallization slightly increasing with an increase in the amount of antimony. The alloys containing 1 and 2 per cent of antimony were fairly tough ; the alloy with 3 per-cent was inclined to be brittle, and this property gradually increased, until with 7 per-cent of antimony it was quite brittle.

The comparison of surfaces of the solders showed that with 1 per-cent of antimony, the surface is not so good as that obtained with ordinary tinman's solder, whereas with 2 per-cent of antimony a surface equal to or better than tinman's solder can be obtained. On increasing the antimony above 2 per-cent, roughness, spots, pimples, or frostiness are obtained. The results obtained in the larger molds confirmed those produced on a small scale.

The microscopic examination of the solders containing antimony throws some light on the effect of this metal. In the case of the alloy containing 3 per-cent of antimony, bright, cubical crystals are seen on the prepared sections after polishing and etching with hydrochloric acid. These crystals probably consist of the compound SnSb, and as it has a lower specific gravity than the bulk of the alloy, it rises to the surface. On the other hand, the alloys containing 1 and 2 per cent of antimony respectively contained no separated crystals of this compound.

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*Abstract of a paper read at the Autumn Meeting of the Institute of Metals held at Manchester, England, October 14th and 15th.

Effect of Copper

Varying quantities of copper were added to the solder by first making a tin and copper alloy and using it for introducing the copper. The chief effect of copper is to cause blisters and crystallization down the center. In quantities of less than 0.6 per-cent the surface appearance is not bad. Above 0.6 or 0.7 per-cent the surface appearance was quite inferior, as it became dull, flat and crystalline in addition to having many blisters. It may be mentioned that copper has a much greater effect on the surface appearance of tin than on solder. On fracturing, it was noticed that copper hardened the solders, increased the toughness, and changed the silky fracture into a minutely crystalline one.

Effect of Silver

The effect of small quantities of silver on the surface appearance was ascertained, because certain Colonial users of large quantities of solder prefer these to be made with lead containing silver. In these experiments the silver was alloyed with the lead and then the necessary tin was added, and the solder poured into a marble mould as before.

Up to 0.2 per-cent of silver, a peculiar but by no means unpleasant appearance is given to the solder which, on increasing the silver, develops into a very white and distinctly crystalline surface, especially about the center of the ingot. These solders were quite tough.

Effect of Zinc.

Extremely small quantities of zinc were found to be absolutely fatal to the appearance of the solders. The effect of zinc is to produce a minutely crystalline surface when the quantity present is from 0.01 to 0.02 per-cent. With 0.1 per cent, the surface is very crystalline with pimples, blisters and is uneven. Besides the very inferior surface appearance, difficulty was met with in pouring clean from the crucible, a tendency to the formation of skins and skulls being noted.

Effect of Bismuth.

In quantities up to 1 per-cent, bismuth was found to have no appreciable effect on the surface appearance of tinman's solder.

Conclusions.

1. Tinman's solder containing 2 per cent of antimony gives, under proper conditions of casting a surface which is bright, clear, smooth, and superior in appearance to that of the alloy consisting wholly of lead and tin in equal proportions.

2. Solders containing more than 2 per cent of antimony give surfaces which are either rough, spotty, frosty, or pimply, but the extent to which these defects are present does not increase in proportion to the amount of antimony added.

3. The surface obtained by casting in marble moulds does not seem superior as regards brightness, smoothness, or clearness to that obtained in iron moulds, but a more clearly defined furrow is generally obtained.

4. Solders containing small quantities of copper give good surfaces, but with a tendency to blister, while larger quantities give dull, flat, crystalline surfaces.

5. Solders containing small quantities of silver have a peculiar white crystalline appearance on the surface.

6. Zinc is a most detrimental metal to have present in solders, as minute traces give very inferior surface appearances.

7. Bismuth in small quantities has no effect on the surface appearance of solders.

Method of Making a Compound Copper and Steel Billet.

A method of making a compound copper and steel billet has been patented by William Griffith of Pittsburg, Pa. (U. S. Patent 936,713, Oct. 12, 1909). The billet consists of a steel core and a copper shell. When rolled

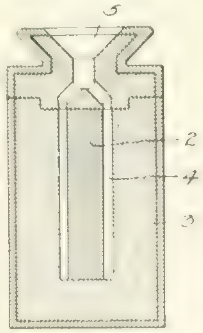


Fig. 1. Mold for Casting the Compound Ingot.

into sheet or drawn into wire, compound sheet or wire is produced. The manner of casting the compound billet is as follows:

A steel billet is pickled or sand blasted to remove the scale and rust and is then inserted in a mold 3 shown in Fig. 1. Previous to placing it in the mold, however, this billet is dipped into a solution of sulphate of copper for a moment so that it becomes coated with a film of metallic copper. In case this cannot be done at once, the billet is immersed in a solution of potassium chromate which prevents the rusting. After the copper has been deposited by the dipping, the billet is inserted in the mold shown in Fig. 1 and is indicated by 2. The molten copper is then poured into the mold through the gate 5 and unites with the billet forming a steel core with a shell of copper. It then has the appearance, shown in cross-section, indicated in Fig. 2. When rolled the well known copper coated steel is produced.

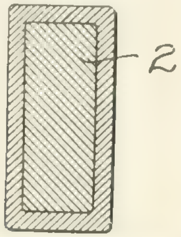
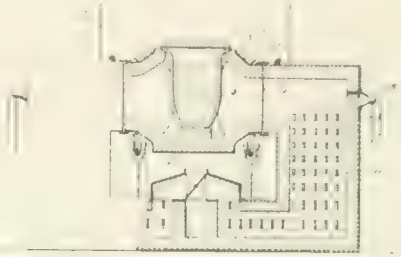


Fig 2. Cross Section of Compound Ingot, After Casting.

A Regenerative Crucible Tilting Furnace.

A new form of crucible tilting furnace constructed on the regenerative principle has been patented by W. M. Carr and Chas. H. Speer of the firm of Carr & Speer, New York City (U. S. Patent 936,751, Oct. 12, 1909). It is claimed by them that heretofore it has been impossible to construct a small furnace for melting metals in which the regenerative principle is employed, on account of the limited flame travel. They have, however, constructed a furnace, herewith illustrated, in which this principle is employed.

Oil is used for the fuel and is burned at the side of the furnace 13. The crucible is made stationary and the portion of the furnace containing it revolves so that the metal may be poured. The flame, after striking the crucible, traverses the checker brick work and heats it. When this has been done, the path of the flame is reversed, and passing through the previously heated brick, is superheated so that a high temperature is obtained. The inventors have found that by very materially reducing the dimensions of the furnace chamber so that the contained flames are at no point more than a foot or so distant from a hot, heat radiating, refractory furnace wall, it is possible to produce a new type of regenerative flame burning with great velocity without the use of a large excess of air and without stratification.



Carr & Speer's Regenerative Crucible Furnace.

It is stated by Messrs. Carr & Speer that with a furnace of this construction, having a capacity of 500 or 600 lbs., it is possible to melt steel with a consumption of fuel oil of about 20 gallons per ton. In large regenerative furnaces holding from 5 to 50 tons, 35 to 40 gallons of oil are considered good practice. It is also stated that thin walled crucibles may be used with excellent results.

Salt is almost universally used in the brass rolling mill industry as a flux in melting yellow brass, and it is usually considered that good brass cannot be made without it.

When the best quality of brass castings is desired, the use of the best red metal mixture is to be recommended. The cost of the metal is of secondary importance compared with the quality of the castings. On account of the large amount of zinc that it contains, yellow brass never casts as soundly as red metal

Coating Iron and Steel with Copper, Brass and Bronze by the Hot Process.

While it is possible to coat iron and steel with zinc and tin by dipping into the molten metal, and thousands of tons of such material are daily made, it would seem that little or no attention has been paid to the coating of these metals with copper or brass. To be sure, cow-bells have been coated with brass by sprinkling brass filings on the surface of the sheet iron form, then coating with borax and finally with clay, after which they were heated in a fire to melt the brass and cause it to adhere to the surface. The manufacture of such cow bells is still carried on in a certain locality, and they are very cheap in price and equally so in appearance. The brass does not coat the surface evenly but adheres in spots. This process would appear to be the first attempt to coat iron and steel with brass on a commercial scale.

The electrodeposition of brass and copper is satisfactory as far as it goes. With copper, it is possible to obtain a heavy deposit, but it takes time and the coating does not always adhere in the desired manner. With brass, it may be said that it is almost impossible to obtain a deposit electrolytically that is satisfactory as far as thickness is concerned. It has the color and the lustre, but no method is known of producing a heavy brass deposit similar to that which can be obtained with copper.

To obtain a heavy brass or copper deposit has always been the desire of manufacturers, and now is even greater than ever before on account of the rapidly extending use of automobiles upon which not only strong materials are necessary, but which also must have a good appearance. It is impossible to make such parts of solid brass in every case, as the strength and often the cost are against their use. Not only in the case of automobiles, but in hundreds of other instances is the value of a durable and heavy copper or brass coating being realized.

For a number of years, Walter S. Rockey and Hillary Eldredge have been experimenting with the problem of coating iron and steel with copper, brass and other metals by simple immersion in the molten metal, and have finally succeeded in overcoming the obstacles in the way until a satisfactory product has been obtained. They have been conducting their work in an experimental laboratory at 462 Tenth Ave., New York City, and in which the articles herewith illustrated were made. So far, the experiments have been conducted on a small scale, but as they have been attended with such success, a larger plant is to be installed in which work of considerable size may be treated.

Articles Brass Coated by the Dipping Process.

The process consists of dipping the iron or steel to be coated in molten brass, copper or other metal that is used for the coating. In the early experiments, graphite crucibles were used for the melting, but it was found that the graphite interfered with the process and so far, clay crucibles have been used for all of the successful work. As these are necessarily small, the idea was having made a large clay pot similar to that used in glass making and in which the metal can be melted in large masses.

The secret of the coating lies in the flux used. While this is now guarded somewhat jealously, an application for patents has been made so that its composition will probably sooner or later become known. The flux is previously made up in a separate crucible and poured out so that it can be broken up for use. A different flux is used for each metal-as it was discovered that a flux for one metal or alloy would not work well with others. The flux is made in a clay crucible and ample time given for the various ingredients to unite and form a homogeneous mass.

In case the iron or steel article is to be coated with brass, any desired mixture of this alloy is melted in a crucible and well covered with the flux. Much depends upon the heat of the melted metal, and unless it is maintained at a suitable degree, the coating will not be as good. If the metal is too cold, the brass will not run from the surface when the article is removed and a very heavy coating will be obtained. On the other hand, if the metal is too hot, the coating is too thin and is apt to oxidize. A pyrometer is required for the proper working of the process.

When the brass has arrived at the right heat, the iron or steel article to be coated is immersed in the metal by means of a pair of tongs. It is allowed to remain a few seconds and is then removed. It will be noticed that the surface is now covered with a uniform, white enamel. This enamel is in reality the flux. As soon as the article is removed, it may be plunged into water which will cool it so rapidly that the flux will scale off, or it may be left in the air to cool and the flux may then be easily removed and saved for returning to the crucible.

When the article has thus been dipped and cooled, it will be found that the brass has evenly coated the whole surface and has firmly united with the metal. In addition to this, it has a bright, uniform color as though it had been polished.

The article to be dipped in the molten metal does not need to be cleaned from oxide and grease, as the flux will effectually remove them. Iron and steel that are black may be coated without pickling. Cast-iron, however, does not respond so readily and it is probable that the graphite on the surface interferes with the coating. When it is pickled or scoured, the article of cast iron may then be coated as readily as sheet metals or wire. It has been found that if the cast-iron is first sand-blasted, an ideal surface is produced for coating and to which the metal adheres tenaciously and evenly.

Herewith is shown a variety of articles coated with brass by this process. They will serve to indicate the field open for it. Copper or bronze may be used in the same manner. Gold and silver have also been used with success and experiments are now being conducted with nickel alloys. Owing to the fact that the melting point of nickel and steel are about the same, it has been found impossible to coat articles of iron or steel with pure nickel, but it is expected that by alloying the nickel to reduce its melting point, the operation will be attended with success.

Notes on the Causes of the Corrosion of Copper and Brass.*

By E. L. Rhead, F. I. C.

The corrosion of copper and its alloys has, more particularly during recent years, been forced upon the notice of metallurgists and engineers by the many instances of failure of these metals when subject to conditions under which previously they had been found to be sufficiently resistant.

1. The corrosion and pitting of the tubes of surface condensers, more particularly those using sea and estuarine waters for condensing purposes.
2. The decay of Muntz metal sheathing, bolts, and the underwater fittings of ships.
3. The deterioration of brazing alloy in copper pipes.
4. The corrosion of steam-ship propellers.
5. The corrosion of the interior of locomotive boiler tubes.
6. The rapid corrosion of copper sometimes noted on articles built up from sheet copper and subject to the action of fire gases.

Particulars of the corrosion of brass and Muntz-metal are given in a paper by J. T. Milton and J. Larke (Proceedings Inst. Civil Engineers, April, 1903, page 138)

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*Abstract of a paper read at the Autumn meeting of the Institute of Metals held at Manchester, England, Oct. 14th and 15th.

In condenser tubes, the corrosion results in the formation of longitudinal grooves, pitting and perforation of the tube, and the formation of plugs of spongy copper, in addition to the more or less uniform reduction in thickness that gradually takes place in tubes that behave satisfactorily. The pits or holes are funnel shaped with the wide end of the pit on the water side of the tube. Occasionally such tubes show wastage from the steam side, but it is then more generally diffused. Pitting may extend over the whole surface, but it is more common on the side which is lowest when the tubes are in position. The pits are more or less in lines, but frequently some are much more pronounced and are irregularly placed.

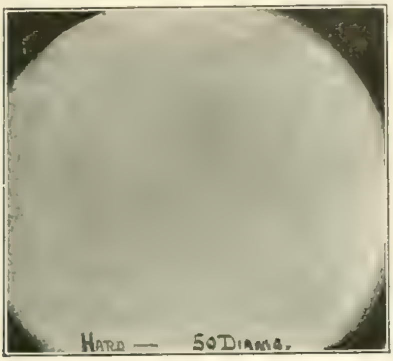


Fig. 1. Hard Brass Magnified 50 Diameters.

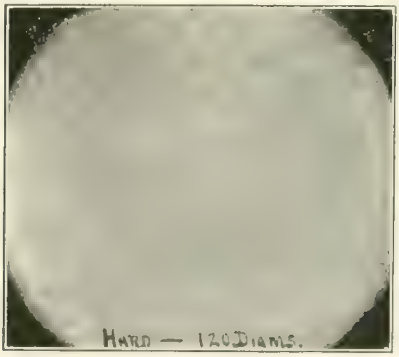


Fig. 2. Hard Brass Magnified 120 Diameters.

The plugs of spongy copper may extend through the thickness of the tube so as to allow them to be pushed out. They are roughly circular and could not have remained unalloyed in the manufacture of the tubes, as in that case they would have become elongated in the drawing of the tube. They could only result from the removal of zinc or by redeposition of copper.

The interior of the tube, when removed from the condenser, may be almost free from deposit, or there may be a considerable amount. In the event of serious corrosion the latter is often the case. This deposit consists of matter produced by the corrosion of the metal forming the body of the tube or by material mechanically carried in by the cooling water.

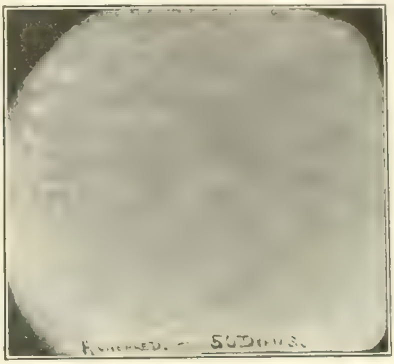


Fig. 3. Soft Brass Magnified 50 Diameters.

Sometimes much hydrated oxide of iron is present in the deposit, and frequently organic matter. Occasionally cinders form part of the solid matter present. The accumulation of this matter points to the water current being too slow to carry it away; it will consequently be more strongly heated.

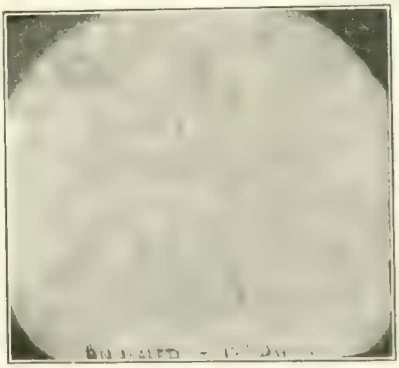


Fig. 4. Soft Brass Magnified 120 Diameters.

Rapid failure of condenser tubes is generally accompanied by deep local pitting. These that last for long periods show more or less uniform corrosion.

In Muntz metal and other similar alloys used as sheathing, tube plates, &c., the corrosion may extend inwards from the surface though not equally from every part, till the whole mass is completely changed. The residue is brittle, breaks with a dull fracture, but yields a bright surface when filed. In other cases where rapid circulation effectually removes the products, general wastage accompanied by pitting may occur.

The corrosion of locomotive tubes generally results in the scaling of the tube, with more or less roughening of the interior. This in some cases takes place rapidly. The deposit contains oxide and chloride of copper in large amounts, in addition to smaller quantities of sulphate. In one instance the author found 48 per cent copper, 18 per cent zinc, and 1.87 per cent of sulphur present in the deposit removed from the tube.

The suggestions put forward in explanation of this peculiar behaviour are based on: 1. Selective chemical action. 2. Corrosion resulting from chemical action set up, or promoted by, the electrical conditions resulting from the presence, side by side, in the alloy, of different components containing the constituents of the alloy in varying proportions, or from the presence of included impurities 3. The effect of vagrant electric currents escaping from the electrical equipment.

Below are given the results of a series of experiments on the corrosion of copper and brass in various agents. Plates of hard, soft and polished copper were exposed in groups of three to the various solutions.

1. A 7.5% solution of hydrochloric acid. 2. A 15% solution of common salt. 3. Common salt through which a stream of carbonic acid gas was passed. 4. Common salt with the addition of 1% of ammonium nitrate. .5. Same as No. 4 except with a stream of carbonic acid gas passing through. 6. Common salt, with the addition of 1% of hydrogen peroxide. 7. As in 6 with a stream of carbonic acid gas passing through. The experiments were continued for 90 hours. The loss of weight occurred in the following ratios:

Copper	Soft	Hard	Polished
1.	37	48	73
2	5	3	15
3	18	37	40
4	15	5	15
5	55	56	44
6.	8	14	14
7.	37	57	47

It will be seen that the hard copper shows greater susceptibility to attack although the experiments are not sufficiently conclusive.

The ammonium nitrate was introduced to illustrate in some measure the possible effects resulting from the use of sea-water contaminated by sewage, a condition sometimes arising in shore and estuarine installations, and in river and coasting vessels. Such water is also liable to be much more highly charged with carbonic acid gas than ocean water, the gas resulting from the decomposition of the organic matter present.

Hydrogen peroxide was used to illustrate the effect of a non-corrosive oxidising agent similar in effect to dissolved oxygen.

The increased action in the presence of carbonic acid gas is in all cases marked.

Further experiments were made as follows A strip of the same hard brass measuring 0.02 inch thick was softened over a portion of its length, and bent in the form of a U. The two limbs were placed in a corroding liquid containing approximately 10 per cent. hydrochloric acid and 5 per cent copper chloride. They were left for twelve and twenty-four hours respectively. On removal from the liquid the difference in the rate of attack was very obvious. The hard limb had been seriously corroded, especially on the side facing the soft limb. The irregularity of the attack was very marked. It was most vigorous in lines running across the strip. There were parallel to each other, and in the direction of rolling. Along these lines deep grooves had been cut, and the surface was porous and roughened. Near the surface of the liquid, as might be expected, the action was much more extensive than lower down, but it extended to the bottom of the strip. When the experiment was prolonged to twenty-four hours the differences were still more pronounced. The hard limb was so corroded that the part near the surface of the liquid was reduced to a mere film 0.003 inch thick, and could only be removed from the liquid, without breaking away, with care. One of the strips actually broke away. Lower down the corrosion was somewhat less, and at the bottom the thickness was much greater, but showed strong corrosion. The softened limb was little affected; a few very shallow grooves across its surface, and slight roughness near the top of the liquid, being the only effects of the treatment. After annealing and cleaning, it originally measured 0.019 of an inch thick, and at the top, in the most affected part, 0.0185, while lower down its thickness was the same as at first. The skin had not been removed except in the lines. It may be, I think, assumed that these represented the irregularities not completely removed by the annealing. They extend quite across the strip.

It appears from these results that the hard material is electro-positive to the softer, and solution, therefore, more rapidly takes place. Whether this is due to the fracture of the crystals during cold rolling, by which the texture is made more permeable to the corroding fluid, or whether the state of strain in which the metal exists in the hard material is the cause of the more rapid attack, does not appear.

In the discussion *re* J. T. Milton's papers already referred to, various points then raised seemed to suggest that the causes of corrosion were not necessarily connected with the purity of the metal.

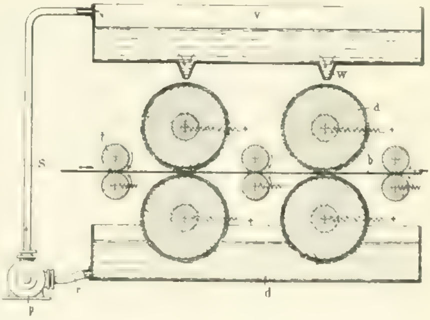
The figures given by Mr. Darley in connection with Muntz metal sheathing used in protecting harbour piles were very striking, materials in use for twenty-five and twenty-six years respectively showing little appreciation of the copper contents. He asserted that the trouble did not arise prior to 1899, and gave instances of very rapid deterioration subsequently. Without necessarily accepting the latter date, it may be that the increase in power of the rolling-mills, and other appliances used in the working of copper and brass during recent years, and other changes in the process of manufacture may in some measure account for the changes in texture of the material, and it would appear that it should be the aim of the manufacturer to secure the greatest uniformity. The practice in tube making of giving the tube a final cold drawing in order to stiffen the tube, but not so as to render annealing necessary, may develop hardness sufficient to account for the initial roughening of the surface from which the corrosion is subsequently continued in increasing amounts promoted by the liberation of gas. This renders irregular action possible without reference to slight changes in the composition of the metal.

It does not appear possible to deal satisfactorily with the cooling water. The higher the temperature of the steam passing to the condenser and the slower the rate of flow, the higher will be the final temperature of the cooling water. This must effect the liberation of gases from the water and the effect upon the tubes.

The corrosion of propeller blades is probably not unconnected with the liberation of gas from the water by the differences in pressure resulting from the revolution.

Electrogalvanizing Sheet Steel.

A new method of electrogalvanizing sheet steel has been patented by Wm. Pfanhauser of Leipzig, Germany (U. S. Patent 936,472, Oct. 12, 1909). The sheet is shown by *b* in the illustration and electrical contact is made by the rollers *t*. The novelty of the process lies in the use of felt covered anodes in the form of rollers. These rollers are designated by *d* and the solution is allowed to fall on them from the overhead tank *v* into which it is pumped continuously from the lower tank *d*.



Pfanhauser's Electrogalvanizing Apparatus for Sheet Steel.

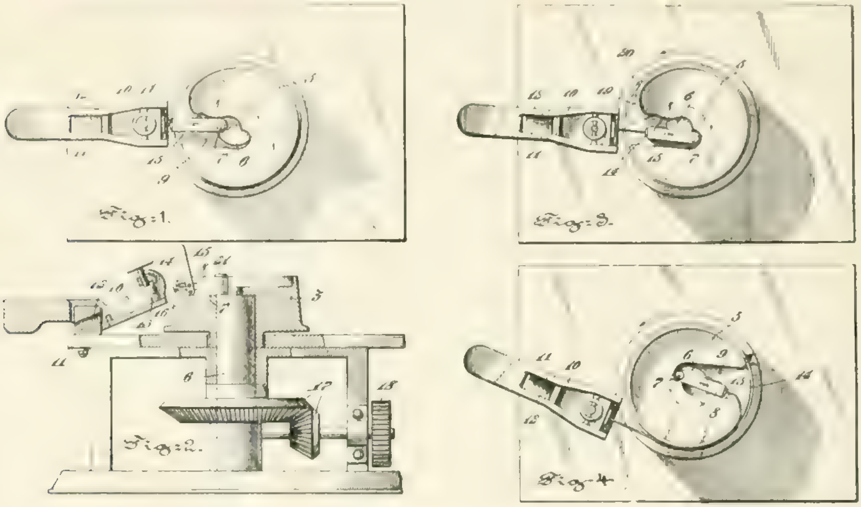
As the sheet is fed along, the zinc deposits upon it and it is claimed that the advantage of the process lies in the fact that a uniform coating is given the sheet on both sides. The inventor states that the process is also applicable to other kinds of electrodeposition, although primarily designed for depositing [illegible]

Wire-Block with Draw-Out Attachment.

In the usual method of drawing wire, the end of the coil is reduced by swaging (or "pointing" as it is called) so that it will protrude through the die. The end is then gripped by a pair of tongs on the draw-out attachment worked by a cam. The end of the wire is thus drawn through a die to a sufficient length to allow it to be fastened to the wire block.

The use of the draw-out attachment means an extra operation and is attended with shock so that the end of the wire is often broken off and the die injured. In recent patents (U. S. 935,335, 935,336, and 935,564, Sept. 28, 1909) Hugh L. Thompson of Waterbury, Conn. the well known rolling mill engineer, has obviated the need for the draw-out attachments by the use of a peculiarly constructed wire block. The construction of the block may be understood by reference to the sketches herewith shown.

The die holder is shown by 13 in Fig. 2 and is made flexible to allow the wire to pass through at the different angles without binding. The end of the wire pointed in the usual manner, is passed through the die and caught by the grip 15. The block is now started to revolve at the usual speed. The first position is illustrated in Fig. 1. By means of a cam movement 6, the wire is drawn through the die at a gradually accelerating speed so that all shock is avoided. It is accomplished by the cam 6 which does not revolve at the same speed as the drum. The further positions are indicated in Figs. 3 and 4 and from which it will be appreciated that the wire is drawn gradually through the die without shock and with accelerating speed. This speed finally reaches that of the drum and the operation goes on in the regular manner.



Sketches Illustrating Thompson's Wire Block for Obviating Need for Draw-Out Device.

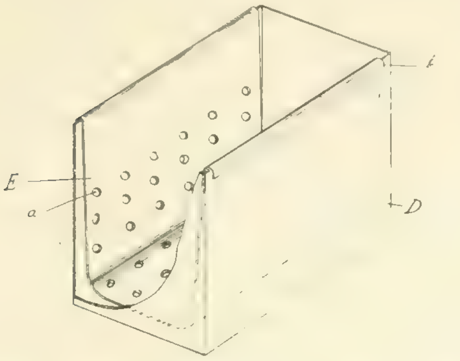
A New Method of Removing the Tarnish from Silver Goods.

A new method of removing tarnish from silver goods has recently been patented by Marshall H. Keyt of Chicago, Ill. (U. S. Patent 937,154, Oct. 19, 1909).

The articles to be treated and from which the tarnish is to be removed ,such as, for example, spoons or forks, either sterling silver or silver-plated ware are placed in E., a basket made of copper or other suitable metal This basket rests in an outside receptacle D which is made entirely of zinc. A solution composed of the following is placed in the outside receptacle or tank D:

Water	1 gallon
Sodium carbonate	2 oz
Sodium bi-carbonate	2 oz.
Sodium sulphate	1 oz

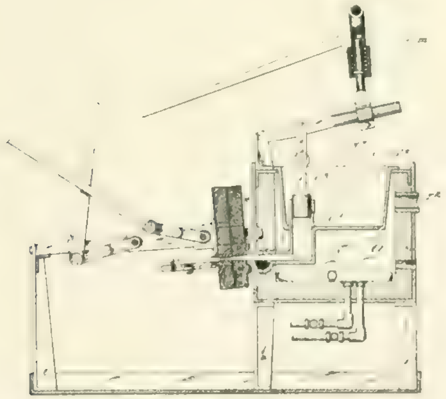
The solution is preferably used warm. The electrolytic action set up between the articles and the zinc serves to remove the tarnish from the goods in a rapid manner. The metal is not attacked. It is claimed that other metals besides silver may likewise be cleaned in a similar manner.



Sketch Illustrating Manner of Removing the Tarnish from Silverware.

A New Pressure Casting Machine.

A new form of machine for casting small metal articles in molds under pressure has been invented by Joseph Soss and Adolph W. Christianson of New York City (U. S. Patents 936,378 and 936,486, Oct. 12, 1909). The construction of the machine may be understood by reference to the illustration.



Soss and Christensen's Apparatus for Casting Metals Under Pressure.

The metal is melted in a kettle C by a gas burner underneath. In the bottom of the kettle is an outlet in which a piston C3 fits. This piston is operated by a lever which is, in turn, worked by a cam on the pulley *m*. A spring is provided on the cam lever so that shock is avoided when the piston is depressed. By means of a belt shipper or similar device, the piston lever is depressed by power and the metal forced into the mold. The outlet C5 connects with the mold M which has an opening fitting closely over the nozzle. The levers supplied with toggle joints serve to force the mold tightly against the nozzle.

Boiling Points of Metals.

Some interesting and valuable results on the boiling points of the common metals have been determined experimentally by H. C. Greenwood *(Royal Society Proc.* A 82, 1909). The metals were heated by an electric furnace while contained in a long graphite crucible. Outside of this was a carbon tube resistance furnace. The depth of metal used was about 30 mm. The temperature was taken by an optical pyrometer and the boiling point noticed by observing the surface of the metal by means of an absorbing glass. The point at which the metal actually began to boil, and that at which particles were violently ejected from the surface differed but slightly and was found not to exceed 100° C.

The following boiling points were determined:

Iron	2450° C.	or 4442°F.
Copper	2310° C.	or 4190°F.
Tin	2270° C.	or 4118°F.
Chromium	2200° C.	or 3992°F.
Silver	1955° C.	or 3551°F.
Manganese	1900° C.	or 3452°F.
Aluminum	1800° C.	or 3272°F.
Lead	1525° C.	or 2777°F.
Antimony	1440° C.	or 2624°F.
Bismuth	1420° C.	or 2588°F.
Magnesium	1120° C.	or 2048°F.

These results are of interest in demonstrating that some metals, notably copper and silver, boil at a much higher temperature than usually believed. The boiling of these metals, which frequently occurs in melting, and at a comparatively small increase in temperature over the actual melting point, is apparently caused by the expulsion of gas absorbed during the melting and is not a true boiling

Questions and Answers.

Question No. 710. We desire to know what is the cause of the imperfections in the yellow brass castings that we have sent to you. These castings are automobile parts, and are polished before using. You will note that there are numerous small spots in the surface and they are not pin holes. The mixture we are using is the following: Copper 66%; spelter, 33%, and tin 1%. To 200 lbs. of this mixture we add 4 oz. of aluminum. When the castings are taken from the mold, they are apparently sound and free from imperfections, but when turned down the flaws make their appearance. In the opinion of our foundry foreman, the spelter is at fault as we recently changed the brand. Can you inform us the cause of the flaws?

Answer. An inspection of the castings that you have sent us indicates that the flaws in them are caused by the presence of dross. The spelter has nothing to do with them. Either you are pouring the brass too hot, or the gate to the casting is too short. It should be borne in mind that yellow brass containing aluminum must be poured at as low a "heat" as possible, and that as long a gate or runner as possible should be used. One or both of these obstacles is the cause of your trouble. If you will be careful with your heats, and not make the gate too short, you will be able to cast the pieces with very little loss in the shape of bad castings.

Question No. 711. What is the best method of coloring aluminum black? I have some aluminum castings upon a fire-arm and desire to color them to correspond with the rest of the device.

Answer. There is no satisfactory method of coloring aluminum except by means of a black lacquer. While it can be copper plated and then oxidized by means of liver of sulphur, blistering is apt to follow the plating operation so that the surface will not be very satisfactory. Coloring the aluminum direct is a matter not yet possible, although the future may witness its discovery. As it is now possible to obtain black lacquers, both dead and glossy, of excellent quality, they form an easy and reliable means of coloring aluminum. If of a good grade, they are very tough and durable.

Question No. 712. What is the so-called "cyanide process" used in gold mining and what effect does the cyanide have on graphite crucibles that are used by the mining companies? What we desire to know is what kind of treatment crucibles receive in the industry. As makers of crucibles we have had the proposition brought before us.

Answer. The method of extracting gold from ores by the cyanide process consists in leaching out the finely ground ore by a solution of potassium cyanide in water. The gold is dissolved and the earthy matter left. The solution containing the gold is then treated with zinc shavings which precipitates the gold. The gold is then filtered out and melted in a crucible with a flux. As the precipitate is well washed, it contains very little cyanide and the only action on the crucible is that of the flux. In reality, there is practically no different requirement for the crucible than in any kind of melting in which a flux is employed.

Question No. 713. We have some small brass discs that are part of an optical appliance and which we nickel plate. These discs are made of sheet brass and a number of holes are drilled in them. After the discs have been nickel plated (they are polished previous to nickel plating) a number of small streaks start from the holes and traverse the surface. We have been unable to locate the cause. Other work plates well in the solution and the nickel deposit has a good color. We have sent you one of the discs and would like your opinion.

Answer. An inspection of the disc shows that the nickel solution is in good condition and the deposit has a satisfactory color. The cause of your difficulty is in the fact that the buffing dirt accumulated in the small holes and was not completely removed during cleaning. When plated, it gradually worked out forming the streaks on the surface. If you see that it is removed in the preliminary cleaning, you will have no further trouble.

Question No. 716. Do you know of any sterling-silver companies that use iron crucibles? We understand that they have been used in the past, and we thought possibly there might be some particular reason why they were or are used. Are they used in the Mint? Do the large manufacturers of sterling-silver use them?

Answer. We cannot find that iron crucibles are used at all at the present time for melting sterling or fine silver, either in this country or abroad. If used, it must be in small or obscure establishments. Iron crucibles were at one time used, but have been displaced by graphite crucibles. There is no advantage in them, they are costly, and unless great care is used, introduce iron into the silver. Graphite crucibles are now used by practically every manufacturer of sterling-silver and by the Mint.

Question No. 717. Can nickel be deposited directly upon electrogalvanized iron and steel goods? We have heard that it cannot be done and would like to know about it.

Answer. Nickel plating directly upon zinc is not a very satisfactory operation although possible if the work is connected before immersion in the solution and by using a strong current at first. The nickel plating of an electrogalvanized surface is even more difficult and should not be attempted without first copper or brass plating. When this is done, however, the nickel plating is readily carried out and it is the method generally followed.

QUESTION No. 718, What is the best bronze mixture for use in making cash register cases? These are fancy patterns and quite thin. The metal must be of good color and cast well. It must also dip in a satisfactory manner.

Answer. There is nothing to be gained in using scrap or a cheap mixture or cheap metals for your purpose. The best metals that can be obtained, and the best mixture will always be found the cheapest in the end. The following mixture will give you the best results for your purpose:

Copper	89 lbs.
Tin	7 lbs.
Lead	2 lbs.
Zinc	2 lbs.

This mixture will run sharp, give an excellent color, and cast soundly.

QUESTION No. 719. Will you please advise if there is any special process of obtaining a clean, white background upon nickel plated stove castings? We are using rouge for polishing the nickel and it adheres in the background giving it a dirty appearance. Is there any preparation that can be used for the purpose which will not act in this manner? Possibly the dirt is due to our carelessness.

Answer. You should not use rouge for this purpose as it will always bother you in the background. Use Vienna-lime or other special white preparations that are now made for this purpose by the different manufacturers of buffing and polishing compositions.

QUESTION No. 720. In making brass handles for automobiles we cast a square steel rod in them for the shank. This rod is set in the mold like a core. We are having much trouble with blow holes around this core where the brass casts around it. Pickling in sulphuric and muriatic acids has been tried, and we have had the chill turned, but none of them seem to remedy the difficulty. The mixture we are using is composed of half return scrap (sprues, gates etc.) and half rolled sheet brass clippings with 2 oz of aluminum for a flux. The charge is covered with charcoal during the heat.

Answer. The trouble with your steel cores is that they are either greasy or rusty or both. The customary method of treating steel cores of this kind when they are cast in brass, is previously to heat them red hot at the ends where the metal is cast around them, and then allow them to cool before setting in the mold. In this manner you will have no trouble with blowing.

QUESTION No. 721. We are making a line of forged steel tools upon which some parts are brazed with ordinary brass brazing solder. After brazing, the joint is yellow. Is there any solution that can be used to color the joint the color of the steel?

Answer. There is no solution that you can use for such a purpose. The only remedy is to nickel plate the tool. If the price of the tools will warrant it, you could use silver-solder and then have the joint the color of the steel. We believe, however, that you will find nickl plating about as cheap. We suggest trying the silver solder in order to ascertain whether there is a possibility of your being able to use it. Perhaps German-silver would answer.

QUESTION No. 722. In our copper plating department, in which we daily copper plate large quantities of stamped steel goods, we are having considerable trouble with our employees who work over the tanks in which the plating is done. After working a few days, the men commence to be troubled with an affection of the throat and eyes, accompanied by sneezing and a swelling of the eyelids. The copper is a hot solution and is used almost exclusively on steel goods. Is there any method by which this diffiuclty can be overcome and the men prevented from becoming injured?

Answer. The only satisfactory method is to place hoods over the tanks and connect, by means of suitable piping, to an exhaust fan. Hot cyanide solutions give off a much greater quantity of fumes than those which are run cold.

QUESTION No. 723. Has chromium been used at all in making commercial non-ferrous alloys? Owing to the fact that it imparts excellent properties to steel, it has occurred to me that possibly it might be of equal advantage as an ingredient of the brasses and bronzes.

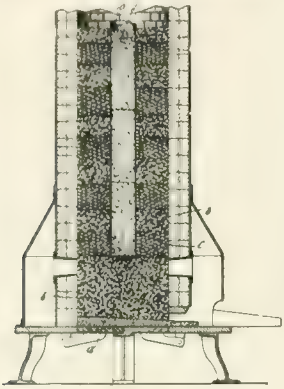
Answer. Although it is quite probable that chromium can be made to impart valuable properties to the brass, bronzes and other copper alloys, as far as known no commercial use has been made of it. Of the effect of chromium on brass and bronze little is known, and we believe it offers a very promising field for investigation with a possibility of producing some valuable mixtures.

QUESTION No. 724. What acid is used in etching steel by the "painting on" method? The steel is hardened.

Answer. We do not what kind of a resist you are using, but presume asphalt paint. If this is the case, then you can probably use a rather strong acid. For etching steel, dilute nitric acid is almost invariably employed. You can probably use a mixture of 2 parts of water and 1 part of nitric acid for the etching. If this proves too strong, then add more water. For etching upon a light resist, a mixture of 4 parts of water and 1 part of acid is generally used. For a good, heavy resist, such as that obtained by asphalt paint, 2 parts of water and 1 part of acid may be employed. It is, of course, always safer to use the weaker acid, and the only difference in results between the weak and strong acids is in the length of time taken to etch the steel. The weak acid is far less apt to lift the resist.

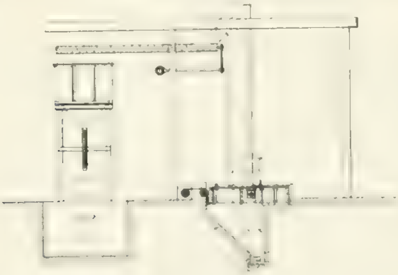
Patent Abstracts.

935,686, Oct. 5th, 1909. PROCESS OF MELTING METAL CHIPS AND APPARATUS THEREFOR. Walter F. Prince of Elizabeth, N. J. A method of melting iron chips, borings etc. They are placed in an iron or steel sheet can and melted in a cupola. The high melting po'nt of the sheet can protects the chips from oxidation until nearly ready to melt.

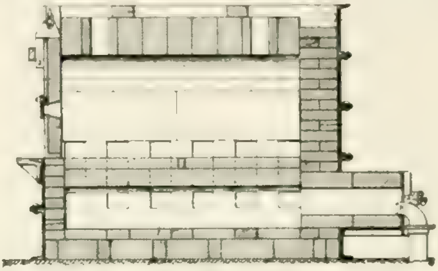


937,170, Oct. 19, 1909. COMPOSITION OF MATTER USED FOR POLISHING PURPOSES. William J. Ochs of Jersey City, N. J. The composition is made of ground cork, one-half oz.; cement, 3 oz.; emery, 1 oz.; carbonate of soda, one-half oz. and camphor, one-half oz. The materials are ground and made into blocks. They are used for scouring and polishing metals.

935,058, Sept. 28, 1909. PLANT FOR SHERARDIZING. William C. Robinson of Pittsburg, Pa. The apparatus herewith illustrated is intended for removing the zinc dust from the charging retort by means of an endless conveyor, and then emptying it into a new retort that is being charged for inserting in the furnace.

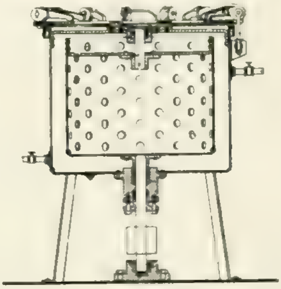


936,856, Oct. 12, 1909. FURNACE FOR UNIFORMLY HEATING METALS. William N. Best of New York City. A furnace for heating, forging or the melting of metals, as constructed for such a purpose. The object of the different constructions for each kind of furnace is to allow a uniform temperature in all parts. The gas or oil flame is admitted beneath the floor and delivered to the heating chamber through a series of ports near the roof.

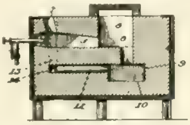


934,988, Sept. 28, 1909. PROCESS OF MAKING DURABLE CARBON ELECTRODES FOR ELECTROLYTICAL PURPOSES. Gustav Adolph of Ammendorf and Albert Pietsch of Madgeburg, Germany. Assignors to Chemische Fabrik Buckau of Madgeburg, Germany. A method of treating a carbon electrode with platinum chloride and then heating. The carbon then becomes impregnated with metallic platinum which, the inventors say, greatly improves the electrode for many purposes.

936,657, Oct. 12, 1909. APPARATUS FOR CLEANING OIL WASTE. J. I. Orkin and Jacob Isaacs of Boston, Mass. 'An apparatus for cleaning oil from cotton waste used for wiping machiner.y. The waste is placed in a perforated receptacle rotated by power and steam let in. The grease is extracted and forced out of the waste by centrifugal action.



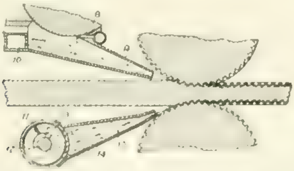
936,573, Oct. 12, 1909. FURNACE OR FORGE. Wm. Scrimgeour, Jr., of Portsmouth, Va. Assignor to the Mircs Fuel Oil Equipment Co., of Norfolk, Va. A furnace for heating or forging, utilizing gas or oil for fuel. The claim is on the construction as illustrated herewith so that economy is obtained by the improved combustion of the fuel. The removal of slag from the bottom, cheapness of furnace, and construction of the flues are some features claimed.



933,761, Sept. 14, 1909. MOLDING MACHINE. John Kiburz of St. Louis, Mo. Assignor to the John Kiburz Pattern Co., of the same place. A molding machine in which the pattern is situated on both sides of the pattern plate so as to be reversible and allow both parts of a two part mold to be made from it.

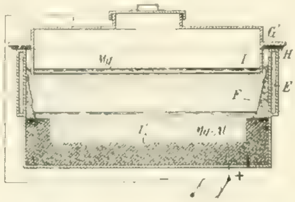
936,939, Oct. 12, 1909. MOLD FOR CASTING METAL POTS ETC. John Power of Pueblo, Col. This invention is applicable to the casting of pots or pipes. The feature is in the use of a collapsible core arbor so that the core itself may readily be released after the casting has been made. An additional feature lies in the manner in which the mold is swept-up from loam.

936,389, Oct. 12, 1909. METHOD OF TREATING METAL. Frank L. O. Wadsworth of Sewickley, Pa. A method of introducing a finely powdered metal or substance on the surface of metal during the hot rolling. The finely powdered material is injected on the surface while the metal is passing through the rolls as shown in the illustration.

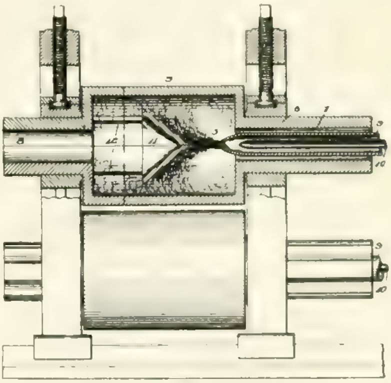


936,572, Oct. 12, 1909. MACHINE FOR CUTTING METAL RODS. George H. Scott of Worcester, Mass. Assignor to the Morgan Spring Co. of the same place. A machine for cutting up the scrap from wire coiled springs. The machine has been designed to cut such coiled scrap easily and renders it suitable for scrap metal.

935,796, Oct. 5, 1909. PRODUCTION OF MAGNESIUM. Franz Von Kügelgen of Holcombs Rock, Va., and Geo. O. Seward of East Orange, N. J. Assignors to the Virginia Laboratory. The magnesium is obtained from its chloride by melting with potassium chloride, passing a current through using carbon anodes and an aluminum cathode. The magnesium combines with the aluminum, and when it forms a rich alloy, this is removed and used as the anode in another bath. In this manner a pure magnesium is deposited from the alloy.



936,821, Oct. 12, 1909. METHOD OF BLUING METAL. Harry E. Sheldon of Pittsburg, Pa. A method of bluing sheet steel and iron by means of chilled rolls. The rolls are heated inside by means of a gas or oil flame so that the sheet, when it passes through, is raised to the temperature required for bluing.



937,163, Oct. 19, 1909. METHOD OF MAKING CASTINGS, INGOTS AND THE LIKE. Frederick F Mesta of Pittsburg, Pa. Assignor to the Mesta Machine Co., of the same city. A method of avoiding pipes in metal castings, particularly those of large size. The casting is made with a sink-head in the usual manner, and this head is maintained in a fluid condition by means of a suitable burner, until the body of the casting has cooled and drawn from it.

Trade Items.

A new factory of reinforced concrete is to be built by the American Safety Lantern Co. at Glen Falls, N. Y.

A new brass foundry is to be erected by the Southern Iron & Equipment Co., at Atlanta, Ga., and which will be operated in connection with their locomotive shops.

The Eagle Coloring Co. has been started at 38 Crawford St., Newark, N. J., by Edward Fisher and will carry on silver as well as gold plating.

John C. L. Shabeck of Providence, R. I., has purchased the button manufacturing plant of the D. R. Child Novelty Co. at North Swansea, Mass., and will continue the business with the same line of goods.

The Deane Steam Pump Co. of Holyoke, Mass., manufacturers of steam pumps, are obtaining estimates on brass foundry equipment and will install a brass foundry at their works.

The Valleyfield Iron Works, Valleyfield (P. Q.), Canada, have begun the manufacture of aluminum castings at their works. A. Moore is in charge of this department. The latest equipment for the work has been installed. The main office of this company is at 324 West Craig St., Montreal.

R. B. Seidel, Inc., 1322-1334 Callowhill St., Philadelphia, Pa., the well known manufacturer of graphite crucibles, stoppers, nozzles, stirrers and other graphite products, was established in 1866 and is, therefore, one of the oldest crucible manufacturers in the United States. All goods are made under the personal supervision of the proprietors and a specialty is made of crucibles for oil furnaces.

The Committee appointed to arrange for the convention of the American Foundrymen's Association to be held in Detroit in 1910 held a meeting in that city on Oct. 12th. Frank T. F. Stephenson is chairman of the local committee, while President F. N. Perkins of the Foundry and Manufacturers Supply Association is to complete the general arrangements. The convention will probably be held at the fair grounds on Woodward Ave.

Emil L. Steiner, 58 Union St., Newark, N. J., the well known manufacturer of ovens for various purposes, has been given the agency for the Johnson Patent Core Oven and is now manufacturing it for the trade. This oven is of unique construction and is the invention of a practical core maker who used it for some time with the best of results. The advantage of the oven lies in the fact that while a tray is exposed for charging, the oven is always closed so that no heat is lost. When the green cores on the tray are inserted in the oven, the other side may be opened for use. When this is done, however, the oven door is automatically closed. Great economy of fuel and rapidity of drying is therefore, obtained.

The Dixie Steel Co. has been incorporated at Fayetteville, N. C. with a capital stock of $100,000 and are to manufacture computing scales.

The Le Grand Bronze Co. has been incorporated at Plainfield, N. J., and will make "Le Grand" bronzes in ingots, billets, and castings. The office and works are 417-419 Berckman St.

The firm of Kendrick & Davis, Lebanon, N. H., manufacturers of watch makers' tools, motors, and sponge platers, have incorporated under the name of the Kendrick & Davis Co. F. B. Kendrick is the president; R. R. Wood, treasurer; and W. H. Crozier, superintendent.

Preparations are being made by the Detroit Valve & Fittings Co. of Detroit, Mich., to erect a plant at Wyandotte, Mich., in which brass and iron fittings will be manufactured. The plant will cost about $50,000. The cost of the equipment will nearly equal this amount.

The Enterprise Brass Works, Muskegon, Mich., have under consideration a new foundry to be 48 x 128 feet and with a steel roof. Brass, bronze and aluminum castings are the products of the company and the new addition will greatly increase the capacity of their plant.

The Weber Mfg. Co., of Jamestown, N. Y., manufacturers of furniture trimmings, brass, bronze and aluminum castings, as well as stamped metal goods, have been succeeded by the Weber-Knapp Company who will continue to manufacture the same line of goods. The manufacturing facilities will be increased by additions to the present buildings.

The new office building to be erected by the Hanson & Van Winkle Co., of Newark, N. J., the well known manufacturers of electroplaters' and polishers' supplies and equipment will be located at 269 and 271 Oliver St., and of re-inforced concrete. It will be 40 x 60 feet and three stories high. The first floor will be used as a show room, the second floor for offices of the officials, and the third floor will contain the general offices. The building is being erected by the American Concrete-Steel Co., of Newark.

The Bassite Smelting & Mfg. Co., of 1015 Second National Bank Building, Cincinnati, Ohio, desire to call attention to the valuable features of "Bassite" which has now been on the market for some time and has given much satisfaction as a substitute for tin. Tin is the most expensive metal that enters into the composition of bronzes, and "Bassite" is used to replace it with a great reduction in cost of the mixture. It is stated by this company that a difference of $220 per ton is saved in making ordinary bronze when "Bassite" is employed instead of tin. This, it will readily be seen, is a profit in itself and will command the attention of all brass founders.

A new brass foundry is being started by Henry M. Wright of Springfield, Vermont.

The U. S. Sherardizing Co., of New Castle, Pa., have installed a Sherardizing plant at the works of the American Tube & Stamping Co., of Bridgeport, Conn.

The Fielding Brass Co., has been organized at Charlotte, N. C., with a capital stock of $20,000 and will establish a brass foundry and machine shop for the manufacture of plumbers' brass goods.

The Model Brass Foundry, 1212 Race St., Cincinnati, Ohio, conducted by J. H. Ryan and E. M. Boland, have made an assignment. The assets are estimated at $3,500 and the liabilities at $4,000.

The United Novelty Co., of Lancaster, Pa., have succeeded the Lancaster Silver Plate Co. Th latter concern went into the hands of a receiver some time ago and have now reorganized and started under the new name.

The Metal Dross Economy Co., of Bristol, Conn., desire to call attention to the large number of testimonials they have lately received on their Skimming Tank" for recovering metal from drosses. These testimonials may be noted in their advertisement.

The General Electric Co. of Schenectady, N. Y., are now making tantalum lamps on a large scale. They report that they appear to be sharing the popularity created when tungsten lamps first appeared. Over 2000 of these lamps were used in decorating the war vessels at the Hudson-Fulton celebration in New York City recently.

The American Oil & Supply Co., of Newark, N. J., have opened an office at 146 Eddy St., Providence, R. I., and will cater to the trade in that section. Jewelers and metal workers supplies are manufactured by them. The office will be under the management of Geo. H. Smead, formerly of the New England Refining Co., and later with the Almy, Cory Co., of Providence.

Dr. Leonard Waldo, 40 Wall St., New York City is now preparing plans for the new plant of the Gillette Safety Razor Co., to be built in Newark, N. J. The factory will be erected at Evergreen and Frelinghuysen Aves., and will consist of a one-story, brick, fire-proof building 80 x 200 feet of saw-tooth construction. Other buildings will be added later as the company has purchased a large tract of land in Newark for such a purpose.

The Hartmann Aluminum Solder, manufactured by the Hartmann Aluminum Solder Mfg. Co., 134 West 49th St., New York City, has already established a reputation of being a satisfactory material for soldering aluminum of all kinds. It has been thoroughly tested for more than a year and in automobile repairs and similar lines of work, it has given excellent results. Samples of the solder and additional information will be supplied upon request. The solder is now covered by patents.

The name of the Parr Regrinding Globe Valve Co., of Cleveland, Ohio, has been changed to the Parr Regrinding Valve Mfg. Co. The capital stock has also been increased from $10,000 to $20,000.

The Titanium Alloys Co., of Niagara Falls, N. Y., manufacturers of titanium alloys, have completed plans for additions to their plant which will enable them to produce more of their products.

Queen & Co., of Philadelphia, Pa., the well known manufacturers of scientific instruments, have moved from 8th. and Arch Sts. to the Boyertown Bldg., 1211-1217 Arch St., where their manufacturing facilities have been increased.

The name of the Overland Automobile Co., of Indianapolis, Ind., has been changed to the Willys-Overland Co., and the capital stock will be increased from $800,000 to $1,500,000. It is expected that 20,000 cars will be made during the next year.

The Milwaukee Aluminum Co., of Milwaukee, Wis., manufacturers of aluminum, brass and bronze castings, and now located at 163 Barclay St., are building a new foundry at Reed and South Pierce Sts., at a cost of $13,000. The increase in their business has made this addition imperative.

The Roessler & Hasslacher Chemical Co., 100 William St., New York City are now manufacturing platinum wares of all descriptions and have entered the business on a large scale. They are prepared to supply platinum wares, sheet and salts of all kinds and also purhcase platinum scrap.

A large addition will be made to the plant of Kelly & Jones of Greensburg, Pa., manufacturers of valves and fittings. A new foundry, 60 x 305 feet will be erected, and at a cost of $80,000. It is expected that operations will be commenced at once. This addition has been made necessary by the inability of the company to handle the increased business.

The International Silver Co., of Meriden, Conn., will soon become a Connecticut corporation instead of a New Jersey one. At the time of their formation, they were incorporated under the laws of New Jersey. They will now reincorporate under the laws of Connecticut. As all of their various factories are in Connecticut, it is considered more advantageous to have a Connecticut charter.

The Acheson Oildag Co., of Niagara Falls, N. Y., a concern recently organized to market one of the inventions of E. G. Acheson of the International Acheson Graphite Co., are now manufacturing "Oildag" for the trade. This material is composed of oil and graphite but the graphite is artificial and has been treated by a patented process so that it does not settle, but remains in suspension. The non-settling property is the principal feature and allows the graphite to be used with oil to the best advantage.

The Iler Mfg. Co. has been incorporated at East Orange, N. J., with a capital stock of $125,000 to manufacture jewelry.

The Indiana Brass & Iron Bed Co. of Mooresville, Ind., are building a $10,000 addition to their plant which will double the output. Nusbaum & Joseph are the proprietors.

The Ellett Electric Co. has been incorporated at Elmira, N. Y., with a capital stock of $10,000 to manufacture gas and electric fixtures.

The Fort Wayne Brass Works has been incorporated at Fort Wayne, Ind., to manufacture brass goods. The incorporators are Maurice Goldberger, J. H. Mandeville and W. J. Vesey. The company has been capitalized at $15,000.

The plant of the Smeeth Copper & Bronze Co. of Chicago, Ill., brass founders, has been purchased by Frank C. Caldwell, president of H. W. Caldwell & Sons. The plant is on Western Ave. and it is reported that $3.000 was paid for it.

The Westerly Jewelry Mfg. & Engraving Co., recently organized at 39½ Clark St., Westerly, R. I., announce that they are manufacturing a line of cuff-pins, collar-pins, belt-pins, bracelets and neck-chains and not scarf-pins as at first announced.

The Brown Automatic Hose Coupling Co., which was recently organized in Cleveland, Ohio, with a capital stock of $30,000 to manufacture hose couplings, have acquired a factory at St. Clair Ave., and East 70th St., where manufacturing will be commenced. The office is now at 218 Superior Bldg.

The Blake & Johnson Co., of Waterbury, Conn., manufacturers of brass working machinery and piano hardware, are now located in their new shops recently erected at Waterville. The office has been moved to Waterville, but the North Elm St. factory has not been affected by the change.

The Riverview Bronze & Mfg. Co., has been incorporated at Buffalo, N. Y., to manufacture brass, bronze and aluminum castings for the trade. A foundry is being built at Gull St., and N. C. Central Belt Line. Patrick F. Woods is the manager of the company and a specialty will be made of phosphor-bronze and manganese-bronze castings. Light aluminum castings for aero-planes will also be a specialty.

The Grasselli Chemical Co., 60 Wall St., New York City and with works in many parts of the United States, are sending out a circular to the trade announcing that they are manufacturers of chloride of zinc for use as a flux in melting aluminum, or as a flux in soldering. It is shipped in the granulated fused, or liquid form and in packages from 50 lbs. to drums of 1200 lbs. Inasmuch as the company are one of the largest manufacturers of metallic zinc, they are prepared to quote attractive prices for the chloride.

A plant to cost $1,000,000 will be built by the United States Aluminum Co. of Pittsburgh, Pa., at Clarksburg, W. Va. Land has already been acquired for the purpose.

The A. H. Yocum Co. of Oakbrook, Pa., are building an iron and brass foundry in that place and which it is expected will shortly be in operation.

The name of the Snyder & Baker Stove Works of Belleville, Ill., has been changed to the Baker Stove Works, but the business remains the same.

The Quanah Machine & Foundry Co., of Quanah, Texas, now conducting a brass foundry in connection with their works, are to erect an iron foundry in the near future.

The Southern Car Co., of High Point, N. C., have increased their capital stock to $60,000 and will commence the manufacture of automobiles.

The Seneca Wire & Mfg. Co., of Fostoria, Ohio have recently received a contract for a large amount of fine wire and which will necessitate the installation of a number of new wire drawing machines.

The Virginian Railway, the new railroad recently built by the late H. H. Rogers, are to erect their shops at Princeton, W. Va., and five new buildings will be started at once. The shops will be in charge of R. K. C. Sanderson, superintendent of motive power.

The Weidlich Bros. Co. of Bridgeport, Conn., now located on Kossuth St., and who manufacture an extensive line of gold and silver plated novelties, such as clocks, jewel boxes, trays, desk sets etc., are now having plans drawn for a new factory to be situated in the East End. It will be of brick and about 140 feet in length.

The Homogen Department of the Allyne Brass Foundry Co. of Cleveland, Ohio, are now sending out to the trade a circular letter describing the qualities of Homogen for use in reducing the leakage in making valve castings and plumbers brass goods. This material not only renders the metal dense and sound, but removes or neutralizes the iron.

The Jennings Silver Co. of Irvington, N. J., has been reorganized and the following officers elected: President, Cyril Johnson of Stafford Springs, Conn.; vice-president, Henry Schuerin: secretary, treasurer, and general manager, Silas Schuerin. About 40 hands are now employed. Silver mesh bags will shortly be a new product of the company.

Owing to a Russian decision, it is probable that the price of platinum will be greatly advanced in price in the near future. About 95 per cent of all the platinum produced comes from Russia, and it is desired by the Russian authorities to prevent foreigners from becoming interested in the mining enterprises. Among the various barriers that are being placed in the way, is one requiring that crude platinum shall not be exported.

A new factory to cost $75,000 will be built by the Buckeye Electric Co., at Hough Ave. and East 43rd. St., Cleveland, Ohio.

M. L. Oberdorfer of Syracuse, N. Y., is building a three story addition to his brass foundry in that city.

Charles Whiteley, manufacturer of silver novelties, has moved to 103 Oliver St., Newark, N. J.

The Spark Lock Co. has been organized at 53 River St., Chicago, Ill. to manufacture a special device for automobiles.

The Globe Jewelry Co., have been organized in Attleboro, Mass., and are now manufacturing a line of plated goods. Otto Newhouse is the manager of the company.

The plant of the Improved Seamless Wire Co., is now being moved from Blount St., to their new factory recently built on Eddy St., Providence, R. I.

The General Brass and Tool Works recently organized at Nashville, Tenn., will be under the management of John H. Lawrence and will operate a brass foundry and manufacture small goods. A machine shop will also be operated.

The Robson Smelting Co., of Buffalo, N. Y., smelters and refiners of white metals and drosses, are sending out to the trade a photograph of their exhibit at the Buffalo Industrial Exposition, held in Buffalo on Oct. 6th. to 16th.

The Bristol Co. of Waterbury, Conn., the well known manufacturers of recording instruments, pyrometers and belt-lacing, are sending out to the trade, their Bulletin No. 113 describing the steel belt lacing which they manufacture. This lacing is made of sheet steel, will not break in service and is easily applied to any sized belt.

C. W. Leavitt & Co., 30 Church St., New York City, the well known dealers in metals and alloys, are sending out to the trade a circular describing the advantages of magnesium in German-silver alloys. In the circular the method of introducing the magnesium is described and other data of much value is given

The McKinnon Chain Co., recently organized to manufacture chain, are to build a factory at Tonawanda, N. Y. The company is a branch of the McKinnon Dash & Metal Works of Buffalo, N. Y. The capital stock is $1,000,000 and an electrical welded chain will be made under the patents of Lachan E. McKinnon

At the annual meeting of the officers of the Wesitnghouse Air Brake Co., of Pittsburgh, Pa., recently held, the following were elected President, Gorge Westinghouse; Directors, H. C. Bughman, John Caldwell, E M. Herr, Chas. McKnight, G. C. Smith, H. E. Smith, George Westinghouse and H. H Westinghouse.

The name of the Sweet & Doyle Valve Co., Green Island, (Troy), N. Y., has been changed to the Sweet & Doyle Foundry & Machine Co.

A new stove concern, called the Colonial Stove Co. is to be started by C. & W. Shinn at Queenstown, Alabama, for the manufacture of stoves. The capital stock is $25,000.

The machinery of the Miller, Fuller and Whiting Co., of North Attleboro, Mass., manufacturing jewelers, was recently purchased by the E. A. Eddy Machinery Co., of Providence, R. I., at auction sale.

The Empire Jewelry Co., of Newark, N. J., recently incorporated with a capital stock of $50,000, are now located at 46 Oliver St., in that city and manufacture scarf-pins, brooches, and hat-pins.

The Crawford Automobile Co., of Hagerstown, Md., are to erect a new factory building 40 x 103 feet. The output will then be gradually increased. The building will be three stories high.

The plant of the Iszard Warren Mfg. Co., of Philadelphia, Pa., has been moved from 122 Vine St., to 136 North 12th St. Instruments of precision are made by this company and the office, showrooms and factory will be in the same building.

The D. H. Lawrence Co. of Sterling, Ill., manufacturers of pumps, and who have not heretofore manufactured the parts, but only assembled them, have moved into larger quarters and will shortly commence the manufacture of their entire product. Bicycle and automobile pumps are also to be made.

A folder illustrating and describing their new home is being sent to the trade by the Progressive Metal and Refining Co., of Milwaukee, Wis. In it is listed the products of the company consisting of Lake ingot copper, red and yellow brass ingot, white metals etc.

Obituary.

August Seher, vice president of the Maas & Waldstein Co., 100 William St., New York City, died on Oct. 7th. aged fifty-nine years.

L. A. Crandall, sales-manager in the Middle West for the J. W. Paxson Co., of Philadelphia, Pa., died at his home in Toledo, Ohio, on Oct 17th Mr Crandall has been in the foundry supply business for over twenty-five years.

Pierce N. Welch, president of the Bristol Brass Co., of Bristol, Conn., died in Berlin, Germany, on Oct. 26th, at the age of 68 years. He was identified with a number of other corporations among which were the New Haven Clock Co. He gave generously to charitable institutions and Welch Hall at Yale University, was one of his gifts. His son, Pierce N Welch, Jr., is treasurer of the Peck Bros. & Co., of New Haven, Conn

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Item	Unit	Price
Acetone, pure 98-99%,	lb.	.22
Acid, Acetic, pure, 30%,	lb.	.07
Acid, Arsenious (White Arsenic)	lb.	.20
Acid, Benzoic	lb.	.55
Acid, Boracic (Boric), pure	lb.	.12
Acid, Hydrochloric, see Acid, Muriatic.		
Acid, Hydrofluoric 30%,	lb.	.04
Acid, Hydrofluoric, 50%,	lb.	.10
Acid, Muriatic, 20°	lb.	.02
Acid, Muriatic, c. p., 20°	lb.	.07
Acid, Nitric, 38°	lb.	.05⅝
Acid, Nitric, 40°	lb.	.05⅞
Acid, Nitric, 42°	lb.	.06¼
Acid, Nitric, c. p.	lb.	.08
Acid, Sulphuric, 66°	lb.	.01¾
Acid, Sulphuric, c. p.	lb.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	lb.	.04
Aluminum, Sulphate	lb.	.06
Aluminum, Metallic, in Ingots	lb.	.24
Aqua-Fortis, see Acid, Nitric.		
Ammonia Water (Aqua-Ammonia), 20°	lb.	.04¾
Ammonia Water (Aqua-Ammonia), 26°	lb.	.06¼
Ammonia Water, c. p.	lb.	.08
Ammonium Carbonate, lump	lb.	.15
Ammonium Chloride (Sal-Ammoniac)	lb.	.12
Ammonium Hydrosulphuret	lb.	.30
Ammonium Sulphate	lb.	.07
Ammonium Sulphocyanate	lb.	.50
Amyl Acetate	gal.	1.85
Antimony	lb.	.08⅜
Arsenic, Metallic	lb.	.15
Arsenic, White (Acid Arsenious)	lb.	.20
Argols, White (Cream of Tartar)	lb.	.31
Asphaltum, Commercial	lb.	.05
Asphaltum, Egyptian (Bitumen)	lb.	.30
Benzine	gal.	.15
Benzol, Pure	gal.	.75
Bismuth, Metallic	lb.	1.75
Bitumen, see Asphaltum.		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	lb.	.10
Borax Glass	lb.	.35
Cadmium, Metallic	lb.	.75
Carbon Bisulphide	lb.	.10
Calcium Carbonate (Precipitated Chalk)	lb.	.10
Chrome-Green	lb.	.50
Copper, Lake, (cask)	lb.	.13⅜
Copper, Lake (carload)	lb.	.13⅛
Copper, Electrolytic (carload)	lb.	.13
Copper, Electrolytic (cask)	lb.	.13¼
Copper Casting (carload)	lb.	.12⅞
Copper, Casting (cask)	lb.	.13
Copper Acetate (Verdigris)	lb.	.35
Copper Carbonate, dry	lb.	.25
Copper Sulphate (Blue-Stone)	lb.	.09
Copperas, see Iron Sulphate.		
Corrosive Sublimate, see Mercury Bichloride.		
Cream-Tartar, see Potassium Bitartarate		
Cryolite	lb.	.12
Cyanide, see Potassium Cyanide.		
Dextrin	lb.	.15
Emery Flour	lb.	.04
Emery, F F & F F F	lb.	.03
Flint, powdered	lb.	.01
Fluor Spar	lb.	.01¼
Fusel-Oil	gal.	1.75
Gold Chloride	dwt.	.60
Gum Copal	lb.	.30
Gum Guaiacum	lb.	.26
Gum Mastic	lb.	.70
Gum Sandarac	lb.	.35
Gum Shellac, brown	lb.	.50
Gum Shellac, white	lb.	.60
Iron Perchloride	lb.	.25
Iron, Sulphate (Copperas)	lb.	.05
Lead Acetate (Sugar of Lead)	lb.	.15
Lead Pig	lb.	.04½
Lead Red	lb.	.12
Lead, Yellow Oxide (Litharge)	lb.	.12
Liver of Sulphur, see Potassium Sulphide		
Manganese, Ferro, 80%,	lb.	.10
Manganese, Metallic, pure	lb.	.75
Magnesium, Metallic	lb.	1.50
Mercury Bichloride (Corrosive Sublimate)	lb.	.93
Mercury, Metallic (Quicksilver)	lb.	.89
Mercury Nitrate	lb.	1.50
Mercury Oxide, yellow	lb.	1.80
Nickel and Ammonium Sulphate (Double Salts)	lb.	.16
Nickel Carbonate, dry	lb.	.60
Nickel Chloride	lb.	.50
Nickel Metallic	lb.	.47
Nickel Sulphate (Single Salts)	lb.	.25
Nitre (Saltpetre), see Potassium Nitrate		
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	lb.	.15
Phosphorus, yellow	lb.	.40
Phosphorus, red	lb.	1.10
Pitch	lb.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	14.50
Platinum Metallic	oz.	32.25
Potash-by-Alcohol, in sticks	lb.	.50
Potash, Caustic (Potassium Hydrate)	lb.	.08
Potassium Bichromate	lb.	.14
Potassium Bitartarate (Cream of Tartar)	lb.	.31
Potassium Carbonate (Pearlash)	lb.	.10
Potassium Chlorate	lb.	.15
Potassium Cyanide	lb.	.25
Potassium Iodide	lb.	2.25
Potassium Nitrate (Nitre or Saltpetre)	lb.	.10
Potassium Permanganate	lb.	.17
Potassium, Red Prussiate	lb.	.60
Potassium, Yellow Prussiate	lb.	.24
Potassium Sulphide (Liver of Sulphur)	lb.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	lb.	.70
Pumice, Ground	lb.	.05
Quartz, Powdered	lb.	.01
Rosin, Yellow	lb.	.04
Sal-Ammoniac, see Ammonium Chloride		
Sal-Soda, see Sodium Carbonate		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Fine	oz.	.50⅝
Silver Nitrate, crystals	oz.	.50
Soda-Ash	lb.	.05
Sodium Biborate, see Borax.		
Sodium Bisulphite	lb.	.15
Sodium Carbonate (Sal-Soda), crystals	lb.	.02
Sodium Hydrate (Caustic Soda)	lb.	.05
Sodium Hydrate (Caustic Soda by Alcohol (in sticks)	lb.	.45
Sodium Hyposulphite ("Hypo")	lb.	.04
Sodium Metallic	lb.	.90
Sodium Nitrate	lb.	.05
Sodium Phosphate	lb.	.09
Sodium Silicate (Water-Glass)	lb.	.04
Soot, Calcined	lb.	.15
Spelter, see Zinc.		
Sugar of Lead, see Lead Acetate.		
Sulphur (Brimstone), in lump	lb.	.05
Tin Chloride	lb.	.43
Tin, Metallic	lb.	.30⅛
Turpentine, Venice	lb.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water-Glass, see Sodium Silicate.		
Wax, Beeswax, yellow	lb.	.45
Wax Carnauba	lb.	.70
Whiting (Ground Chalk)	lb.	.02
Zinc Carbonate, dry	lb.	.19
Zinc Chloride	lb.	.12
Zinc, Sulphate	lb.	.06
Zinc (spelter)	lb.	.06½

THE
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The Aluminum Situation.

The rapid growth of the demand for aluminum castings for automoible work, and the approaching additional demand for them for air-ships has resulted in a peculiar situation in the trade. Appreciating the enormous consumption of aluminum castings that is to take place in the near future, if not already at hand, the large manufacturers of aluminum castings have organized themselves into a parent company of considerable size, as far as aluminum foundries go, in order to cope with the situation, as it is explained, and be able to produce the large quantities of aluminum castings that the trade will need. Extensive improvements are now under way in the shape of increased facilties for making castings, and it is expected that adequate facilities will then be had for taking care of any demand that may be made upon them.

This part of the situation is apparently one of simple expansion, and would naturally seem to have resulted from the law of supply and demand. The other part is the report that the concern is affiliated with the company that produces practically all the aluminum used in the United States. On the assumption that this is true it would apear that the new aluminum foundry is practically a selling end for aluminum castings.

The consumption of aluminum has now increased to such an extent that many founders who heretofore made no attempt to specialize on aluminum have now done so, and their trade has increased to such an extent that a business of considerable magnitude has resulted, and the trade has profited thereby. Local foundries of all kinds are always to be encouraged as they serve to sustain other manufacturers who draw supplies from them. All over the United States the so-called aluminum founders have sprung up, and while many of them, it is true, have not made a marked success of the business, others have and they are able to satisfy the local trade to which they cater.

The question which has now arisen among the aluminum foundry trade, that is without the "fold", is: How will they be able to compete with the so-called "combination"? They are anxious to know whether it will be possible to obtain aluminum at a price that will enable them to do so. The question has now become serious and the aluminum casting trade is giving it much consideration.

White Lacquer.

White lacquer is one of the comparatively recent products of the lacquer trade, and is now coming into more or less extensive use for certain kinds of work for which it is admirably adapted.

White lacquer is made by incorporating a white pigment with lacquer so that it remains in suspension and colors it to the desired degree. It is applicable for all kinds of materials: Metal, wood and other non-metallic materials. The best results are obtained in using it by the employment of a spray or by dipping. Unfortunately it does not give as good results with the brush as when the other methods of applying it are used. It is well known that one coat of a brush lacquer applied by what is known as the "cold process" (or the ordinary process), so to speak, results in the removal of the first coat. While this effect is not particularly noticeable with transparent lacquers, it is readily apparent with the white lacquer, as a heavy coat is necessary in order to obtain the desired whiteness and cover up the color of the base material underneath. For this reason, the spray or dipping process is preferably used in the application of white lacquer.

White lacquer is now coming into extensive use in the finishing of bath rooms and in other decorative applications. Its advantage is two fold. First, the white color is permanent and does not turn yellow with age like white varnishes or paints. Second, the lacquer base itself is a very tough and inert substance. In use, therefore, it is not readily scratched or injured by water or corrosive liquids. The future will undoubtedly see white lacquer used very extensively, as it seems to fill a want heretofore unsatisfied by the white paints and varnishes on the market. For metals, as well as wood, it will probably be widely employed.

Properties of Pure Titanium.

In *Stahl and Eisen* H. Kaiser gives the results of his experiments on the production of comparatively pure titanium. The oxide of titanium was reduced by aluminum and a product obtained containing 53.72% of titanium, 45.17% of aluminum and 1.31% of silicon. This material was compressed under great pressure, saturated with hydrogen gas and then electrically fused in a vacuum so that the aluminum distilled off.

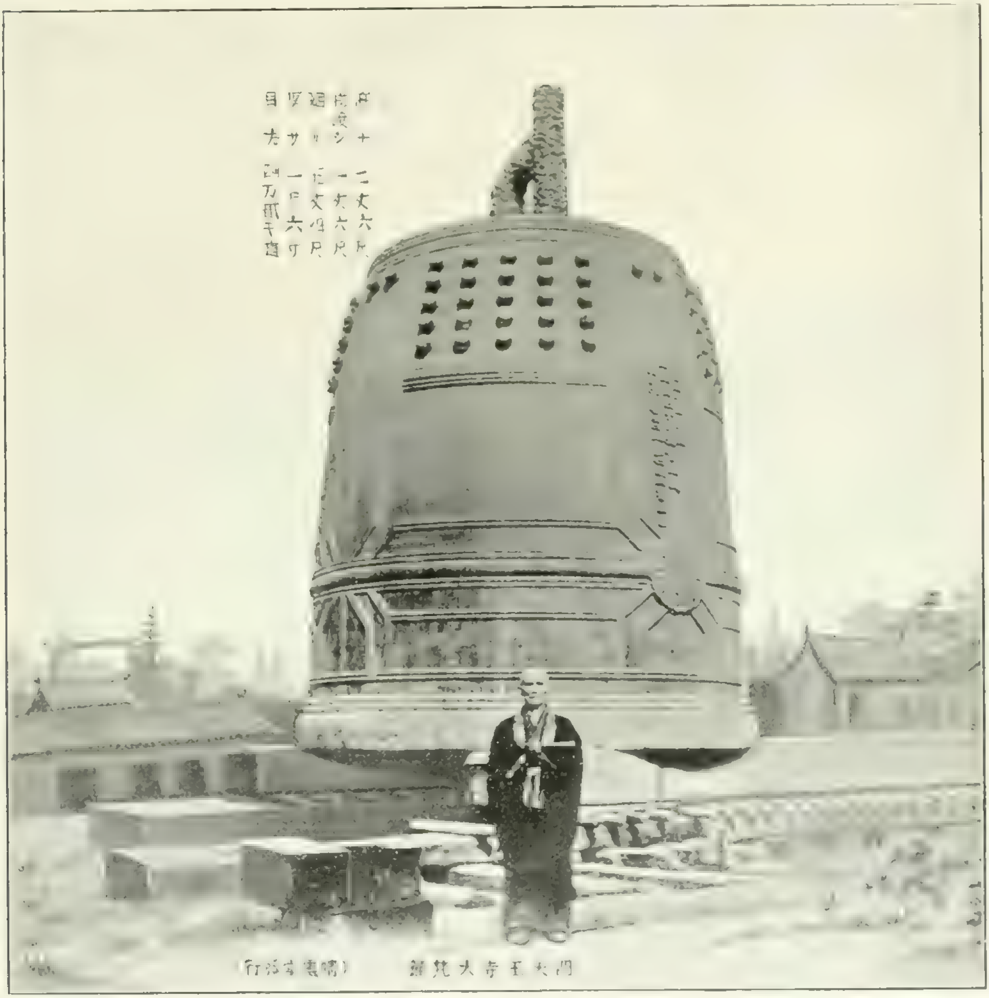
The melting point of the titanium thus obtained was found to be between 2200 and 2400 degrees C. (3992 and 4352 degrees F.) The pure, fused titanium was silver white in color and contained 97.41% of titanium, 1.56% of hydrogen and 0.30% of carbon. Its specific gravity was 5.174. At 1360 degrees C (2480 degrees F.) it absorbed 23.31% of hydrogen gas.

In melting yellow brass chips, the waste can be greatly reduced by the use of a suitable flux which will protect the metal from oxidation. The loss in melting is not caused so much by the volatilization of the zinc as it is by the oxidation of the metal

Japanese lacquer is a substance made from the sap of trees and is, in reality, a varnish. It is used like a spirit lacquer and as many as eighteen coats are applied to a fine piece of work. Japanese wares usually owe at least a part of their beauty to the use of this lacquer.

A Large Japanese Bell Casting; the Largest Perfect Bell in Existence.

That the Japanese are not ignorant of the art of bell founding is evidenced by the large, and it may well be said, enormous casting that we now have the opportunity of showing in the reproduction of the photograph. Bell founding does not appear to have made any progress in centuries, and the method of casting is the same to-day as it was at the time the Great Bell of Moscow was made; or, perhaps, when bells were first actually cast from copper and tin.



The Largest Perfect Bell in Existence. Cast in Osaka, Japan, in 1902. Weight, 348,000 lbs. Height, 26 ft.

The photograph of the bell was kindly loaned us by H. H. DeLoss of Bridgeport, Conn., who recently visited Japan and to whom we are indebted for the data in regard to it.

As far as history relates, the method of bell founding centuries ago was to make the mold from clay and sand, or loam as it is now called, sweep the surface by hand into the desired form, make the core in the same manner and then dry the whole by means of a wood fire built in the interior. The metal itself was melted in a furnace of the reverberatory type built for the occasion on the premises, and so arranged that the molten metal could flow into the mold without the intervention of any ladles or other receptacles to carry it. In other words, it was the logical method of casting. There was plenty of time, plenty of money and abundant labor to carry on the work; and another feature which is rarely taken into consideration in conjecturing about the method of casting, is the fact that, should a bell prove imperfect from faulty casting or melting of the metal, it could easily have been broken up for remelting, on account of the brittleness of the bell-metal while hot. Who-knows but that this very thing had to be done? Bad castings are now frequently produced, and it is reasonable to assume that they were then.

The method of casting bells at the present time, even with all the progess that has been made in the science of metallurgy, remains the same. The same loam molds are used, swept up in an identical manner, and the casting is performed as it was then. Perhaps we now have purer metals and the art of casting may have made a little progress in insuring a better toned bell; but the fact remains, however, that the general method of bell founding is the same.

The large bell herewith shown was cast in Osaka, Japan, in 1902; and it will be seen that it is of comparatively recent origin Bells, particularly those of foreign countries, are almost exclusively associated with religion. Even in our own country, by far the greater proportion of bells cast are used in churches and the best and largest are made for this purpose. In olden times, the casting of a bell was made a religious festival. The Japanese bell was also of religious origin as the presence of the priest in the foreground will indicate.

As the photograph shows, the bell has not been removed from its support after having been taken from the mold. It has been raised upon timbers supplied with rollers underneath for moving the bell to the desired location. At the top, the gate is still shown. The shape is somewhat different from the bells of other countries and does not have the graceful curves which they are supposed to have in order to give a good tone. The peculiar ornamentation of the surface should be noticed. While it has always been a custom of the bell founders to place inscriptions upon the outside surfaces of the bells which they have cast, indicating, as the case may have been, the reason for casting it, the owner, the religious data, or the other desired information that was to be accorded, the knob-like ornaments at the top give a peculiar appearance to this bell unlike anything encountered upon others. It demonstrates, in a satisfactory manner, the artistic temperament of the Japanese.

The bell is known as "The Great Bell of the Shitenno Temple"; and, as previously mentioned, was cast in Osaka, Japan in 1902. The data concerning the bell were recorded on the photograph from which the illustration was made. Translated they give the dimensions and weight as follows:

Height	26	feet
Diameter	16	feet
Circumference	54	feet
Thickness	1.6	feet
Weight	348,000	lbs.

The weight is given as 42,000 kwamme, and a kwamme is practically 8.3 lbs. which would make the weight of the bell as given at 348,000 lbs. or practically 175 tons. From this data it will be readily appreciated that the bell is an enormous casting. It is, however, of less size than the Great Bell of Moscow*. This bell, which is supposed to weigh something like 440,000 lbs., is broken and useless so that the Japanese bell is really the largest perfect bell in existence. From the appearance of the photographs of each bell, the Bell of Moscow appears to be the better job of casting. It was cast in 1734 by the order of the Empress Anne. Of the mixture of metals that have entered either of these large bells, little is known, nor has any data been obtained about the actual quality as far as the casting itself is concerned.

In making bronze statues the false core method has proved to be more efficacious and economical than the lost-wax process, on account of the difficulty of removing all of the wax from the mold during the preliminary heating.

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*For a description of the Great Bell of Moscow, see THE BRASS WORLD, June 1907, page 183

The Nitre Process for Bluing Iron and Steel.

The nitre process, as it is now called, was first brought to the notice of the public by a paper presented to the American Society of Mechanical Engineers by Wm. H. Weightman in 1886 which embraced a report by Lieut. Col. A. R. Buffington of the Springfield Armory, Springfield, Mass., made to the Chief of Ordnance. The process was fully described in the report.

The method of bluing iron and steel by means of nitre consists simply in immersing the articles in it while melted. If the right heat is used, the surface is blued in an excellent manner and which will compare favorably with the color produced by heating steel articles in a furnace to the right temperature.

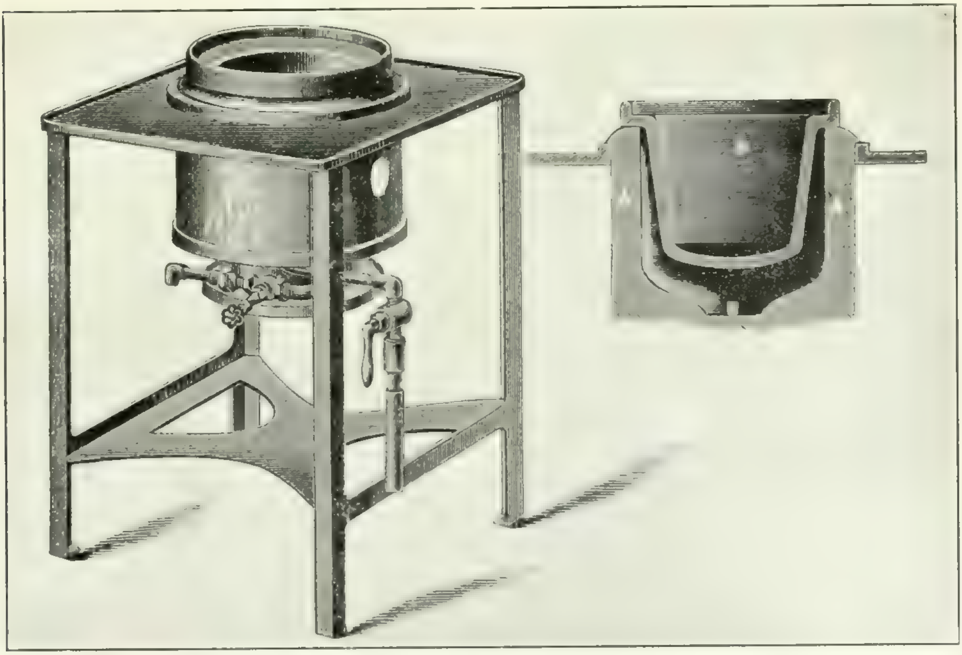


Fig. 1. Gas Melting Furnace with Iron Pot. Used for Bluing Steel and Iron by Nitre Process.

The nitre process can scarcely be called one that is suitable for small goods on account of its cost. Not that the nitre itself is expensive, but the pieces must be dipped carefully in order to obtain the desired color, and then it is necessary afterwards to wash them off and dry them. The customary method of bluing screws, studs, pins etc., is by tumbling them in a sheet iron barrel heated to the right temperature by an external furnace. This method is not only satisfactory, but cheap. To be sure, the nitre process can be used for small work if desired and it gives good results if one can afford to spend the time on it. It is for medium sized and large work that this process is valuable and for which it is extensively used. Large quantities of hardware are blued by the process, and it has the advantage of working equally as well on soft steel and wrought iron as it does on steel higher in carbon. The color may not be quite as good, as it never is on low carbon steels, but it is satisfactory for all purposes and the color is very uniform.

Nitre is a nitrate of potash. It is often called saltpeter and is readily obtained in almost any locality. Instead of the nitre nitrate of soda may be used, and it is a little cheaper than the nitrate of potash. The nitrate of soda is known as "Chili saltpeter."

The method of bluing the steel or iron is simple. The nitre is melted in an iron pot and heated to about 60 degrees F. The articles to be blued are cleaned and polished, if desired, and then immersed in the molten nitre in which they are allowed to remain until the desired color has been obtained in a uniform manner. But a few seconds are required for it, or only until the article has arrived at the heat of the nitre. It is then removed and allowed to cool when it is immersed in water and the nitre which has adhered to the surface is dissolved off. Articles which will not warp or twist, may be immersed in the water immediately after they have been removed from the nitre and the removal of the material which adheres is then hastened. After the articles have been well rinsed in hot water to remove the excess of nitre which adheres to them they are dried in sawdust or by other means and then oiled with a suitable oil, such as linseed, to prevent them from rusting.

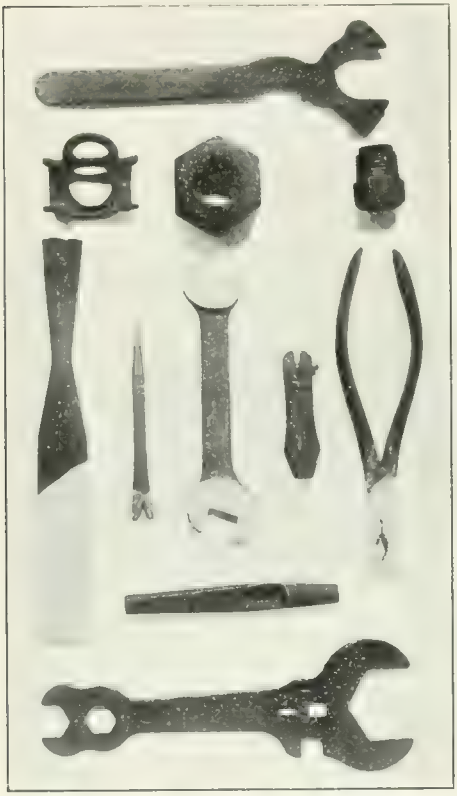


Fig. 2. Steel Articles Showing Application of Process.

The action of the nitre is two fold: First it gives off oxygen which oxidizes the surface of the steel with the production of the blue color. Second, it serves as a medium for heating the steel to the desired temperature for producing the color. If a lower temperature than 600 degrees F. is used, the color is lighter, and by heating to a higher temperature, a dark, blue black color is obtained.

The pot that is used for melting the nitre is of ordinary cast iron, and in Fig. 1 is shown a serviceable appliance that is used for this purpose. The pot is heated by gas. If a uniform color is to be obtained continuously, then a pyrometer should be used to control the temperature as a higher heat will give a darker color, while a lower one will render it lighter. It is usually desired to obtain the same color right along.

Many operators prefer to use black oxide of manganese in connection with the nitre, but it is difficult to understand what advantage is gained by employing it. The color is obtained without it, although, perhaps, the bath may work a little more rapidly when used. Oxygen gas, of course, is given off more rapidly when the two are mixed, but in comparative trials on steel goods, the use of the black oxide of manganese did not appear to offer any particular advantage. The usual proportions employed are 10 parts of nitre to 1 part of the oxide manganese. The nitre is melted and the oxide is added afterwards.

It is a singular fact that although in 1886, Col. Buffington, in the report previously mentioned, described the use of the nitre process and had used it on gun-barrels and other steel goods made at the Springfield Armory, in the year 1906 an English patent appeared (No. 7757 of 1906) on the "Process for the Production of a Protective Coating upon Iron or Steel", and which was granted to Chas. A. A. Tatlock of 156 Bath St., Glasgow, Scotland. The claim is as follows:

"Process for the production of a protective coating upon iron and steel consisting in the treatment of the iron and steel in a bath of molten nitrate of sodium or potassium, or both together, for a period varying with the nature of the article and the thickness of the protective coating desired, as described."

The granting of this patent indicates how patent examiners frequently fail to investigate the state of an art before issuing a patent upon any subject.

Adding Arsenic to a Brass Solution.

Arsenic is the substance generally employed in a brass plating solution to produce a bright deposit. It is a material widely used and there are few platers who really know the simplest method of introducing it. Many unnecessarily difficult and unsatisfactory ways of adding the arsenic are in use, and the following method, by far the best and simplest, may be of service:

Caustic potash or caustic soda are the best solvents for the arsenic. *I*n this connection it may be said that the material employed is the so-called "white arsenic" or the arsenious oxide. The solution is made as follows:

Water	1 gallon
Caustic Potash	1 lb.
White Arsenic	8 oz.

Dissolve the caustic potash (a good quality of caustic soda may also be employed with equally as good results) in half the quantity of water and then stir in the white arsenic. If finely powdered, it will soon dissolve to a clear solution. White arsenic should always be purchased in a powdered condition as manufacturers have the necessary facilities for grinding it. When dissolved add the remainder of the water. In this manner a strong potash solution is obtained which allows the arsenic to dissolve more rapidly than would be the cause were all the water used in the beginning.

For a brass solution, it is customary to use from 1 to 2 oz. of white arsenic to 100 gallons. As a table, therefore, the following may be used:

1 Qt	2 oz. White Arsenic.
1 Pt	1 oz. White Arsenic
8 oz	½ oz. White Arsenic
4 oz	¼ oz. White Arsenic.
1 oz	1/16 oz. White Arsenic

Let it be assumed that a 100 gallon solution of brass is had and it is desired to use 1 oz. of white arsenic in it. Then use 1 pint of the solution. If a small solution of 10 gallons is used and the same proportion is to be employed, then 1.6 fluid ounces are taken.

The arsenic solution will keep indefinitely and is always ready for use. By taking the preceding proportions in making it up, comparatively large quantities of the solution are taken to obtain a small amount of arsenic so that the error of ading too much or too little is minimized. The caustic potash or soda that is added with the solution to the brass bath will have no effect on it.

Tantalum for Surgical and Dental Instruments.

One of the most interesting of the rare metals is tantalum and it is now being used for the production of the tantalum incandescent lamp with the best of results. One of the more recent applications is for surgical and dental instruments for which it would appear to be particularly adapted. Otto Neugebauer of Hanover, Germany and of the Siemens & Halske Co., of Berlin, Germany has patented (U. S. Patent 940,351, Nov. 16, 1909) the use of tantalum in dental and surgical instruments and claims that it is capable of producing results not obtainable with steel.

The advantage of tantalum for this work lies in the fact that it is very hard and non-corrosive and has a high melting point. The pure tantalum is not used for this purpose, but that which is alloyed with a small quantity of carbon, as this element serves to harden it as it does iron. The tantalum thus produced may be worked like steel and can be made to take a cutting edge like it. The inventor states that it can be made harder than hard steel, and at the same time, not become brittle. Therefore, instruments may be made thinner than those of steel and still have the desired properties. The tantalum is not attacked by any fluids met with in the use of the instruments and it may be readily cleaned and rendered antiseptic. It is, the inventor states, not discolored by mercurial alloys used for fillings, nor does it color the porcelain or silicate fillings like steel.

During the year 1909, aluminum was first successfully deposited from an aqueous solution using an aluminum chloride and a cathode rotating at a very high velocity. The deposit, however, has not proved of any value and the feat has no importance other than from a scientific standpoint.

Spurious Sheffield Plate and Other Silver Goods.

U. S. Consul Maxwell Blake, in writing from Dunfermline, Great Britain of the frauds that are still perpetrated on the inexperienced collectors of old silver and china and period furniture by dealers throughout the United Kingdom and continental Europe, says:

"The United States is reputed by the well informed to harbor more 'artistic atrocities' that were purchased as genuine than any other country in the world, and we may see even a greater flux of pseudo works of art to American shores unless these frauds are detected by government experts or rejected by the public taste.

"The forger of old English silver has been somewhat restrained by fear of the law, which makes the sophistication of hall-marks in Great Britain a very hazardous occupation. Likewise, the almost prohibitive prices for which Early English silver is offered confine its collection, generally speaking, to connoisseurs. The ingenuity of the fakir, however, is none the less occasionally exercised to insert into some late piece or modern copy old marks taken from an article of little value. Beyond the actual intrinsic value of the metal, specimens of the Late Georgian period are worthless, yet they are now being extensively collected by many dealers throughout Great Britain for sale to American customers, who willingly pay from ten to twenty times their trade value.

"It is a difficult undertaking to attempt to dispel the threefold illusion that old Sheffield plate is to be found almost anywhere in the United Kingdom; that it is as valuable as silver of the same period, and that the genuine can easily be detected from the spurious by the fact that it has a discernible subsurface of copper. Now the truth of the matter is that much modern electroplate is done on a copper body, as was the case with the old. The precise difference, however, between the old and the new is that, with respect to the former, the silver was first fused and beaten on to a copper block, the whole slab afterwards being worked into shape by hand; whereas, the discovery of the process of electroplating in 1840 or thereabouts, the article to be silvered was mechanically evolved and the silver instantaneously applied by means of the electro process. The results of these two methods are vastly dissimilar, for instead of the play and accident of light on a beaten and uneven surface, which imparts one of the chief charms to the hand-wrought process there is, when the silver has been mechanically applied, only an assertiveness and garish regularity of surface. Genuine old Sheffield plate in its original and unrenovated condition is worth about 80 per cent as much as modern silver, and about 25 per cent of silver of a contemporary period. It is, however, worth five or six times the commercial value of 'faked' Sheffield plate, with which in no other way can a comparison be made. Literally tons of faked Sheffield plate are now being manufactured, most of which, sooner or later, finds its way to America and the colonies.

"With respect to pewter, the love for which did not assert itself until long after most of it had disappeared in the melting pot, it might safely be said that 95 per cent of all one could find through England and Scotland has been made within the last ten years. Likewise, practically all the 'old Dutch' brass articles, such as alms dishes, plaques, candlesticks, and jardinieres are of modern make, although they may reach the dealer via Holland. The production of 'old masters' and ancestors continues a lucrative industry in Great Britain, it being a matter for serious regret that the talent, and sometimes even genius, suggested by these fraudulent works of art should be abased to such mean ends.

"'Old' armor, medals, and medallions, all of modern origin, abound in rich profusion. 'Antique' Spanish, Portuguese, and English paste jewelry everywhere intrudes itself. A flood of cheap and inartistic Japanese ware is also pouring out over the country; prints, gold lacquer, cloisonné enamel, ivory, and bronze contributing a full share to the swelling volume of alloys and commercial antiques."

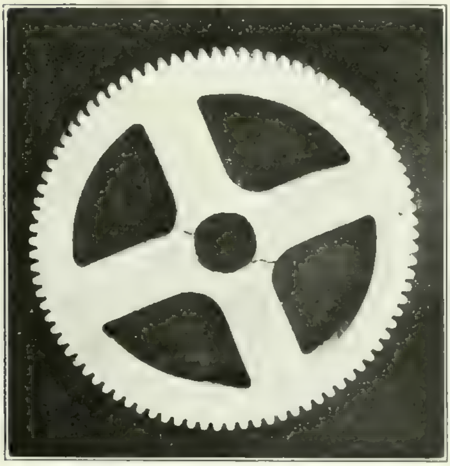
Every compound of gold changes to metallic gold upon heating to redness.

Pitchblende, once a source of trouble in the smelting of ores on account of its refractory nature, is now more valuable than many gold ores on account of the radium it contains, and it is much sought.

The Treacherous Nature of Aluminum-Zinc Alloys in Sand Casting.

By Erwin S. Sperry.

To make an aluminum casting is not a difficult matter for any one who understands the art of molding even to a limited degree. To make a *good* aluminum casting, a knowledge of the subject is demanded that will bring out the qualities of a man to their fullest extent. While practically all brass founders in the United States now make aluminum castings, I regret to say that all can scarcely be called "aluminum founders", and while they make aluminum castings, either from lack of experience or knowledge, they seem utterly to fail in producing a good article. To be sure, much progress has been made within the past few years in the casting of aluminum, as the enormous consumption of the metal certainly indicates it, and when one stops to consider that the casting is one of mastering the art and not a secret, the trade should become attractive to those who already are founders.



Casting of Aluminum and Zinc which Developed Cracks in Machining.

One of the difficulties encountered in the casting of aluminum alloys is the attempt to make castings of an aluminum and zinc mixture. From the time it was first discovered that zinc, when alloyed with aluminum, produced a strong and cheap mixture, trouble has followed. From my own observation, I believe I can safely say that the greater part of the difficulties encountered in casting aluminum are caused by the use of the aluminum and zinc alloys.

I do not desire to be understood as totally condemning the aluminum and zinc mixtures. When well cast they produce the strongest aluminum alloy that can be obtained, but what I wish to convey to the reader is the fact that they are responsible for the troubles encountered by the average brass founder in making aluminum castings for the trade. The cheapness of zinc is too alluring and the founder realizes that he can profit in two ways: First, zinc is the cheapest alloying material he can use. Second, the aluminum will take a larger quantity of zinc than other hardening alloys; and, therefore, the castings weigh more. He is better off, he thinks, to sell zinc at the price of aluminum than he would be otherwise; and, if the occasion demands, he is able to make a corresponding reduction in the price of his work.. Let it be said frankly to the founder; Do not look too enviously upon the cheapness of zinc. What is gained by it may be lost many times by cracked castings.

The difficulty in the use of zinc in aluminum mixtures is that the castings have a great tendency to crack in the mold. It is something that cannot be obviated. The cause is easily understood. The aluminum and zinc mixtures are "hot-short" so that when contraction follows in the mold, if the casting is not free to shrink in every way, rupture follows. Now herein lies the gist of the problem. Is it possible to allow for the contraction so that the casting will not crack? In some cases it is, while in others it cannot be done. A founder who understands this feature of the casting problem always has less trouble than those who do not, but even though he may be familiar with the situation, he will now and then encounter obstacles that he cannot overcome.

Some time ago a manufacturer who had used brass castings for his goods, desired to change to aluminum. The cheapness of the metal allured him, and it so happened that lightness was valuable. He naturally used the aluminum and zinc mixtures. From that time until he abandoned the use of zinc, his troubles were constant. If the castings were not cracked when they were taken from the mold, cracks developed when the machine work had partly been done upon them; and this was the most exasperating portion of the difficulty from the cost of the machine work up to the time the crack was found. His castings were not particularly complicated and were comparatively small, and yet he had actually spent some time in machining it. He changed the gating, tried different pouring temperatures, altered the ramming of the mold, used all new metal and endeavored, by all the known means, to obtain a uniform run of castings upon which dependence could be placed. He informed me at the time, that he could stand even a good percentage of loss; but to find, after a large amount of machine work had been put upon the casting, cracks that previously had been invisible, was something that could not be tolerated. Even then, he was not sure but the castings, which had passed inspection in the shop, might develop cracks when used and thus injure his business an indeterminable amount.

The whole problem of casting the aluminum and zinc alloys lies in overcoming the cracks. Otherwise it produces clean and satisfactory castings. The tendency to crack, however, cannot be avoided as it is the nature of the alloy, and the only alternative is to make the mold and cast the metal in a manner that will have the tendency to overcome them to the fullest possible degree. Whether this can be done or not depends upon the casting. I can say unreservedly that some castings of small and simple shape may be cast as well in the aluminum and zinc mixtures, while others, I feel sure, cannot be cast in a satisfactory manner.

The reader will undoubtedly believe that this article is intended for a wholesale condemnation of the aluminum and zinc alloys. In their favor I will say that they are strong, cast with more freedom from pinholes than the other mixtures, and are cheap. If a founder has had any relative experience with aluminum and zinc, and aluminum and copper alloys, he will certainly be in a position to speak well of the aluminum and copper mixtures, and can quote numerous sad experiences with the aluminum and zinc.

I have carefully watched the progress of the aluminum casting industry as far as the use of the aluminum and zinc alloys go, and believe that castings made from them cannot be depended upon. The hot shortness of the metal will make its presence known in instances where it is not expected, and in large castings it is more conspicuous on account of the greater shrinkage. A casting may have a perfect appearance when removed from the mold and the gates and risers cut off; but as the machine work progresses, a minute crack is discovered which, as the machining goes on, develops into a large one and ruins the casting.

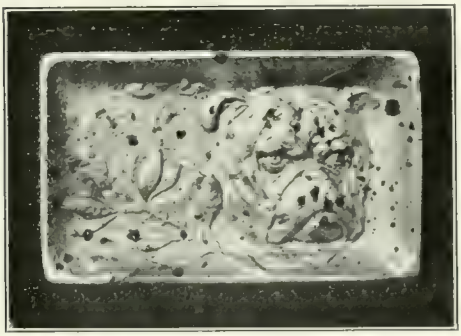
The problem rests with the users of aluminum castings as they are so anxious to save weight that they demand too much tensile strength, and the only manner in which it can be obtained to satisfy their demands is by the use of the aluminum and zinc alloys. They fail to realize the inherent difficulties of the alloy. The strength of a chain is its weakest link, and the strength of an aluminum casting is its weakest part. An aluminum and zinc casting, although a test bar may have been cut from a sound portion and a high tensile strength obtained from it, may have a very low strength when the hidden cracks are taken into consideration, and in this respect the alloy is unique. The cracks may frequently be wholly invisible to the eye, but the least strain, such as that produced in planing, drilling or milling, will render them visible and thus, at the last moment, their worthlessness becomes apparent.

The question to decide, therefore, is whether it is not better to use an aluminum and copper alloy containing from 7 to 8 per cent of copper and which, although not as strong as the aluminum and zinc mixtures, casts with great uniformity and without the treacherous cracks. Manufacturers are gradually arriving at this conclusion, and unless some radical change is made in the manner of casting the aluminum and zinc alloys, we believe they will be much less used in the future. When one stops to consider the extra lightness that the aluminum and copper alloys have, the uniformity with which they may be cast, and freedom from cracking, it is believed that they will be used whenever possible, in spite of the greater cheapness and apparent strength of the aluminum and zinc alloys.

Blisters as a Cause of Spotting-Out.

As one of the causes of the well known "spotting-out" of electroplated work, blisters have not usually been considered. The porosity of the metal has always been taken as the reason for the difficulty, and so it is in the majority of instances, but not all. It is believed that in many cases, blisters on the deposit cause the difficulty and it may be possible, too, that a combination of the porosity and blistering is responsible.

Every plater knows the appearance of a spotted-out article, as he has, at one time or another, come in contact with it, frequently much to his dissatisfaction. There is no more exasperating difficulty encountered in the plating trade, and as the remedy is not fully understood, it often results in disastrous consequences. A plater that is able to overcome bad cases of spotting-out from day to day, is usually capable of taking care of himself in general plating work, and can be classed as an expert.



Copper Plated Soft Metal Tray which Spotted Out on Account of Blisters.

In the majority of instances, spotting-out occurs on cast metal work that has been plated, particularly when it has been plated in a cyanide solution. Cast-iron and malleable-iron give more trouble than cast brass or bronze, as they are more porous and contain more blowholes and flaws. In the case of this kind of spotting-out, the cause is the penetration of the pores, blowholes, and other imperfections in the metal by the plating solution. During the rinsing and drying, which usually take place rapidly, the solution does not have an opportunity to work out, and on the finished article it then gradually oozes out and stains the surface of the metal which it touches. The result is the formation of black or dark colored spots. If such spots are carefully investigated, it will be found that they occur on portions of the article in which blowholes or dross spots are present.

The remedy for such cases of spotting-out as they occur on electroplated cast work of all kinds, is to remove the solution in the pores or cavities of the metal by some means. This may be done in a number of ways, and each has its adaptation. As this has been thoroughly discussed in a previous paper on the subject of spotting-out, it is unnecessary to go into details.

Platers frequently find that sheet metal or soft metal work gives much trouble by spotting out. As a usual rule such work is not porous nor does it contain flaws so that the spotting-out is produced by other agencies. When it occurs, it is usually found that the article has been plated in a cyanide copper or brass solution. The spotting-out as a general thing, occurs more frequently on soft metals.

The source of the spotting-out on soft metal and sheet metal goods, is, as a usual rule, the blisters on the surface. Soft metals particularly are quite apt to blister when copper or brass plated, unless care is taken to use the proper current strength and to keep the solution low in free cyanide Bad cases of blistering are quite conspicuous and the blisters are readily seen with the naked eye. Less severe cases cannot be seen with the eye, but may be readily detected with a magnifying glass. Even though the surface may appear perfect to the eye, it often happens that a few small blisters are present which are the cause of spotting-out.

Why the blisters should cause the spotting out is readily understood. The metal, as it is deposited, encases or surrounds a certain quantity of the plating solution and this gradually works out. Usually the blisters are not sealed so that the solution is contained hermetically and it soon works out and spots the deposit. In other instances, they hold the metal for some time, until it finally breaks out and causes the spotting.

In the illustration is a reproduction of a photograph of a soft metal tray plated in a cyanide copper solution and which spotted out on account of the presence of blisters. The blisters on, it were purposely produced in order to demonstrate beyond question that they were the cause. The tray was cleaned by scouring with pumice and water and then plated in a cyanide copper solution containing considerable free cyanide. A rather strong current was used, and the result was as desired. The blistering of the surface took place.

The tray was then carefully rinsed in cold and hot water and dried. The blisters were quite conspicuous and were readily seen with the eye. A large number of smaller ones were also present, which were seen with some difficulty. For several days the blisters did not begin to spot, but after that time the spots began to show until in a week or ten days they had the appearance shown.

It is apparent then, that blisters are a frequent cause of spotting-out on soft metals, and in order to overcome it, care must be taken to keep the free cyanide down in the copper solution to the lowest possible limit, and to use as weak a current as can be employed.

A New White Metal for Making Plumbers' Goods.

A new white metal has been patented by Chas. F. Ackerman of Cleveland, Ohio (U. S. Patent 939,938, Nov. 9, 1909) which it is claimed is nearly as white as silver and can be cast solid into plumbers' goods, such as faucets, cocks and valves, at a less cost than they can be made of brass, and nickel plated. The alloy consists of the following:

Copper	60	parts,
Zinc	23	parts,
Nickel	12	parts,
Lead	5	parts,
Aluminum	1½	parts,
White Arsenic	1½	parts,

The copper is melted in a crucible and 3½ parts of borax added. The white arsenic is then stirred in and finally the nickel introduced. When melted, the zinc, lead and aluminum are added and the mixture is ready for casting. It is claimed by the inventor that the hardness, whiteness, and power to resist corrosion and tarnishing adapt it to the manufacture of plumbers' fittings.

Correspondence.

Sherardizing Bolts and Nuts.

Editor:

We have been very much interested in the article on "Sherardizing" by J. H. Burn-Murdoch in the November issue of The Brass World.. We appreciate all he says, and feeling that he must be very familiar with the process, we ask the privilege of obtaining further information from him.

We have tried Sherardizing on small bolts and screws with the ordinary standard threads. Contrary to what is claimed for Sherardizing, we were unable to put the nuts on the bolts after they had been coated as the Sherardizing seems to fill up the thread badly. We should like to know whether it is the fault of the company that did the Sherardizing, or whether we have been mislead in our idea of the process. Of course, it is possible to re-tap the bolts and nuts and clean out the threads, and in so doing we still have an article fairly well protected from rust, but the cost of re-tapping is excessive and we understand it would be unnecessary when the Sherardizing process is used.

It is reasonable to suppose that there would be a slight addition to the surface, and a certain allowance for clearance might be made when the bolts and nuts were originally manufactured. The threads in the experiments we have made have been so badly filled up, however, that even this method did not seem to overcome the trouble. We should appreciate some practical information on this line.

Federal Electric Co. *L. G. Shepard.*
Chicago, Ill., Nov. 23rd, 1909.

"Cork" Metal.

At a recent exhibition of air ships held in England a material called "Cork-Metal" was shown as suitable metal for use in the construction of the ships. It was claimed to be 40 per cent lighter than aluminum. The surface had a lustreless, whitish-gray color. According to an English analyst, the metal was nothing but commercially pure magnesium as it gave on analysis: Magnesium, 99.30%; sodium, 0.21%; zinc, 0.48%; iron, 0.017%; and aluminum, 0.04%.

Platinum Plated Anodes.

For gold solutions and experimental work, platinum anodes offer particular advantages and are extensively used. Unfortunately the price of platinum is such that economy is usually practiced in purchasing and with the result that a sheet of platinum too thin to be of real service is employed.

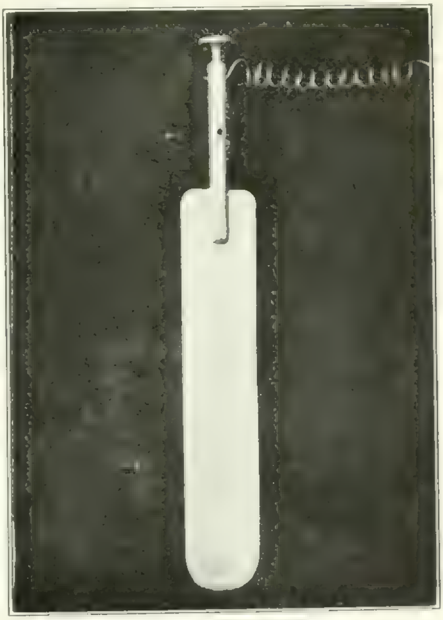
A platinum plated anode offers many advantages for certain classes of work, and it is possible to produce a good, heavy platinum deposit upon brass, copper or silver. The plating of the platinum offers nothing new, although, perhaps it is not widely known that it may be plated in a very satisfactory manner. The solution used by Roseleur, the well known French electrometallurgist, leaves little to be desired and can safely be recommended for the work. Although this solution was fully described in THE BRASS WORLD, October 1906, page 339, it may be necessary again to give directions for making it. The method is as follows:

The quantities given will make up about 1½ gallons. Take 1 Troy oz. (or about 30 grams) of metallic platinum cut up into small pieces and place in an evaporating dish or casserole capable of holding a quart and add 15 oz. (or 450 c. c.) of strong, pure hydrochloric acid and 10 oz. (or 300 c. c.) of strong, pure nitric acid. Warm on a sand bath for some time until all of the platinum is dissolved. Then evaporate until the mass is syrupy. The chloride of platinum thus obtained is dissolved in 3 quarts of water (or 3 litres).

To this solution is now added 15 oz. (or 450 c. c.) of syrupy phosphoric acid (50% solution), the whole stirred with a glass rod and then ammonia is added until the solution smells strongly of it. A yellow precipitate of the double phosphate of platinum and ammonia will be thrown down. Do not filter it out. Leave it in the solution as it will afterwards dissolve. The solution to be right at this point should be strongly alkaline and turn red litmus paper blue.

The next step is to dissolve 50 oz. (or 1500 grams) of sodium phosphate in 3 quarts of hot water (or 3 litres). Now mix the two solutions and heat in a large porcelain dish or glass flask for some time until the smell of ammonia has disappeared and the yellow precipitate has dissolved. When completed, the solution will have a slightly acid reaction which is shown by its turning blue litmus paper red. It is then ready for use.

For plating, the solution must be used *hot.* It will *not* work cold. A temperature of from 150 to 180 degrees F. is good and even hotter gives excellent results. The solution, however, should not actually boil. In order to keep at this temperature, a porcelain dish will be required which may be heated by any convenient means, preferably the sand bath. A strong current is necessary for depositing the platinum. The full 6 volt current is very efficacious. A weak current will not deposit the platinum.



Platinum Plated Brass Anode.

The anode to be plated is preferably made of copper or brass. If of steel, it must be copper,nickel or silver plated as the solution cannot be used to plate direct upon iron or steel. It is usually advisable to connect the work before placing in the solution. The metal to be plated must be absolutely chemically clean in order to produce an adherent deposit, but this is a matter that will [illegible] to be left to the judgment of the plater. It is often preferable on this account to give the article a slight flash of silver or gold previous to platinum plating as a good, clean surface is then had for the deposition. It is not necessary, however, and good, perfectly adherent deposits may be obtained directly upon the brass or copper.

As far as the andoes which have been platinum plated are concerned, it may be said that the one herewith shown has been in use for some time in gold plating with good results, and it cannot be seen that it has deteriorated in any way. In making an anode, care should be taken to avoid the use of soft solder or sharp edges which cause the deposit to peel. The shank, like that shown in the cut, should be soldered with silver solder. If it is to be used on the anode, (and it is quite handy for ordinary work) and the end and edges rounded as shown. In this manner an anode that will give excellent service is obtained.

The length of time that the deposition of the platinum is allowed to take place will have to rest with the operator and will be governed by his desires in the matter. A fairly thick deposit can be obtained in a few minutes, but much longer is preferable in order to produce a thick coating.

If the surface of the metal is bright upon which the platinum is deposited, the platinum will likewise be bright. It is advisable, however, to use a surface for the anode that is a trifle dull as the platinum then adheres better.

Roseleur quotes an experiment that he made with a platinum plated dish in which he made twenty evaporations of nitric and sulphuric acids before the effect of corrosion was shown. This treatment, however, was somewhat heroic and could hardly be taken as an indication of what a platinum plated anode will do in a weak cyanide solution like that employed for gilding.

The pitting of nickel deposits on steel goods is frequently caused by the use of a nickel solution too acid. The acid acts on the steel and liberates bubbles of hydrogen gas. For such work, the solution should contain no free sulphuric acid, but boracic acid can be used as it has no action on the steel.

An Electric Cleaner for Removing Iron Scale.

A solution for removing the scale from iron and steel sheets, pipe, rods, and wire or other forms of goods upon which it may be present, has been patented by Charles W. Danforth and Noble Jones of Sharon, Pa. (U. S. Patent 939,224, Nov. 9, 1909).

The principle of the process is as follows: The iron or steel article to be cleaned is made the *cathode* in the solution and not the anode. The solution consists of a 20% solution of sulphuric acid in water (or 1.15 sp. gr.= 20° Beaumé) and to which 13% by weight of bisulphate of soda is added. The whole will then have a specific gravity of 1.22 (27° Beaumé). The temperature of the solution is then raised by steam pipes to between 100 and 150 degrees F. and a current of 50 amperes per sq. foot is passed through. The scale, the inventors say, will be removed in less than a minute and a half.

For slower work the solution may be made weaker and less current used. As the bath is worked, sulphuric acid is added, whenever required, in order to maintain the specific gravity of the solution. From time to time, as the solution cools at night, crystals of sulphate of iron (copperas) may be removed from the bottom of the tank.

The advantage of the process lies in the fact that the iron is used for the cathode and the scale only is attacked and removed. Contrary to the usual action in pickling off the scale, the metal itself is not attacked and injured. The usefulness of the process lies in the preparation of iron and steel work for plating, enameling, japanning, tinning or galvanizing.

Instead of following the above method of making the solution, it may be more readily prepared in the following manner:

Water	4 gallons
Sulphuric Acid	1 gallon
Sodium Bisulphate	6 lbs

A carbon or graphite plate is used for the anode and it should be of sufficient size to correspond with the cathode surface.

Magnesium has more affinity for oxygen than any other element. It surpasses even carbon in this respect.

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Production of the Verde-Antique Finish Direct Upon Soft Metal Novelties.

The production of the verde-antique finish upon soft metals has, heretofore, been impossible except by the use of the pigment process and this is unsatisfactory for many purposes. To be sure it is extensively used, but the fact that it is a paint is readily noticed and it lacks the appearance produced by the corrosion process. The best class of work and which is much sought, is that produced by methods other than the pigment process.

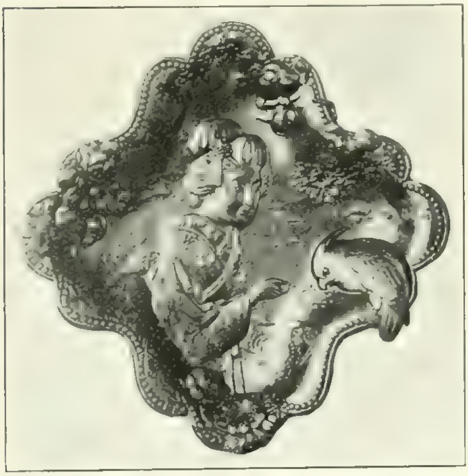


Fig 1. Soft Metal Tray Upon Which the Verde-Antique Finish was Applied Direct.

While corrosion processes are satisfactory on solid bronze or copper, and with the right method are rapidly produced, they have not been successfully used on soft metal novelties for the reason that to produce the verde-antique on a soft metal article, it is necessary to give it a heavy copper deposit so that the corrosive solution used for producing the verde will not remove it and attack the base metal. This fact, together with the cost of the process, has militated against the use of the verde-antique finish on soft metals and when it has been used, the pigment process has always been favored on account of its low cost.

In The Brass World, November 1909, page 393, an article on the production of the verde-antique finish by A. Bider was published. The method was discovered by this author and is unique in that the electric current is used for its production and the verde is plated directly on the work as though it were to be plated with a metallic deposit. The method has proved all that is claimed for it and is one of the most satisfactory known. Since the article was written it has been discovered that the process may be used for producing the verde-antique finish *direct* on soft metals without the necessity of any intermediate deposit of copper. This fact would seem to adapt the finish particularly to the production of the verde-antique on soft metal novelties without the necessity of any preliminary coating whatever The results obtained have so far exceeded expectations, and not only can the verde-antique finish be rapidly and satisfactorily obtained on any kind of soft metal, but also other intermediate effects by not carrying the process as far. Platers can, undoubtedly, obtain many pleasing finishes by means of the solution. It is easily worked and does not require an extensive knowledge of plating.

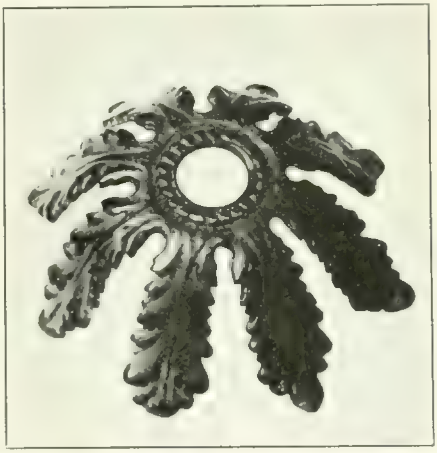


Fig. 2. Article with Verde-Finish which Remained in Original Condition Two Years Without Wax or Lacquer.

The Solution Used

The following solution is used for producing the verde:

Water	1 gallon
Potassium bi-chromate	12 oz.
Copper sulphate	4 oz.

The potassium bi-chromate and copper sulphate are dissolved in the water. As the dissolve slowly in the cold, it is better to heat it and finely powder the substances before using. When dissolved, it is ready for use. It should be allowed to cool.

The soft metal article to be given the finish is cleaned from grease in the usual manner and unless new, it should be scoured with water and fine pumice. The object is to produce as clean a surface as though electroplating were to be done upon it. When the cleaning has been completed, the article is connected to a copper wire and used as the cathode in the solution previously made up. It is connected as though a metal were to be deposited upon it.

For the anode, ordinary brass or copper anodes may be used. Brass seems to give good results. Copper, of course, is the logical anode.

The Deposition.

The current used for the work should be rather strong as the resistance of the solution is high. It has been found preferable to have the work about 6 inches from the anodes and use a current of from 5 to 6 volts. Less current can be used, but the deposition is then slower.

The anodes should be of sufficient number to surround the work on all sides. It will not do to have the anode on one side only as the copper which deposits, and afterwards changes to the verde deposit, then deposits on one side more than another and work without uniformity results. When anodes are used on all sides of the tank, the deposition proceeds regularly without difficulty. The solution can be placed in a stone-crock or wood tank, but an iron tank should not be used. It is used cold as previously mentioned.

When the article is first introduced the deposition commencees. A dark red deposit forms all over the article and soon becomes darker and finally green spots make their appearance. A uniform green appearance is not produced in the solution, but is formed after drying and brushing. The right point at which to stop the operation will remain with the operator as different finishes or rather shades may be produced. If the current is allowed to act for a short time, then a dark brown and green finish is produced that is quite pleasing for some work. If allowed to act a little longer time, the surface becomes spotted brown and green with varying shades of green, while a still longer period produces the true and uniform verde.

When the desired length of time has elapsed, which, for example, may be from a few minutes to fifteen or twenty, the article is removed and allowed to remain in the air for a short time without rinsing. This has been found the better method, although rinsing may be resorted to if desired. The color seems to be more uniform when not rinsed for some time. The article is allowed to remain in the air without drying for five or ten minutes and is rinsed in cold water and then in hot water and allowed to dry.

The surface is afterwards brushed with a soft brush in order to remove the outer film and expose the real color underneath. When this has been done the true verde finish will be exposed. The surface can then be lacquered or waxed as desired. It will be found that the deposit adheres tenaciously to the soft metal and shows no tendency to strip unless exceedingly heavy from having been run for too long a time. The verde may be left without lacquering or waxing, if desired as it seems to hold well and is not susceptible to the atmosphere. In Fig. 2 is shown an article that was produced with the verde antique-finish by Mr. Bider and which has now remained some two years without waxing or lacquering. The finish seems to be unimpaired. In Fig. 1 is shown a soft metal tray upon which the verde was produced by this process without the deposition of any coating of copper underneath.

Theory of the Process.

The theory of the process lies in the fact that copper is deposited upon the article, and, at the same time it is corroded by the bichromate of potassium as rapidly as it forms. There is probably a modification of this process that can be made which would render it even more rapid, although it is very satisfactory as it is. The color is greatly in its favor as it does not have the unpleasant light green shade so common in many of the corrosion verdes.

Good electrodeposits can frequently be made on poor malleable iron castings by first tinning them before electroplating. The imperfections in the castings are then stopped up by the tin.

Use of a Flux in Melting "Monel-Metal."

"Monel-Metal" is an alloy of nickel, copper and a small amount of iron. The proportions of the commercial metal vary slightly, as any commercial alloys necessarily do; but the following proportions may be taken as fairly representing the metal as sold:

Nickel	75 per cent.
Coppper	22 to 23 per cent.
Iron	1½ to 2 per cent.

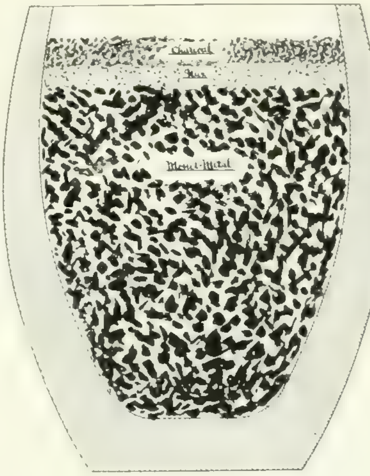
An analysis made by the Orford Copper Co. who manufacture this metal, gave the following average results on a number of samples:

Nickel	70.000 per cent.
Copper	28.874 per cent.
Iron	1.000 per cent.
Carbon	0.112 per cent.
Sulphur	0.014 per cent.

"Monel-Metal" is a "natural" alloy and it is on this account that its future is so promising. In the Sudbury nickel region in Canada, the nickel ore contains copper and iron, and in smelting, these metals are obtained with the nickel. It is not difficult to separate nearly all of the iron from the product thus obtained, but to remove all of the copper is expensive. It is on this account that pure nickel is so expensive. If the copper and a small quantity of iron are allowed to remain in the nickel the product can be sold at a low price, practically approximating that of copper; and, therefore, a non-corrosive nickel alloy of this kind at so low a price has already resulted in a large consumption.

As this metal has begun to enter the brass foundry field, particularly in the manufacture of valves, it is but natural that some difficulties should have been encountered in manipulating it. One of these difficulties is in the actual melting. Owing to the quantity of nickel which "Monel-Metal" contains, it melts at a high temperature, although somewhat less than nickel itself. According to David H. Browne, of the International Nickel Co., it melts at 1350 degrees C. (2462 degrees F.). Nickel itself melts at 1451 degrees C. (2644 degrees F.). The usual experience found in melting it is that it does not become liquid, but fails to pass beyond the pasty stage. In a number of instances encountered, this took place, although the heat of the furnace was apparently sufficient to melt it.

The difficulty in melting "Monel-Metal" is on account of the fact that the average brass founder uses no flux on it. The case is analagous to the melting of nickel and when no flux is used in melting it, much difficulty is experienced. When nickel and alloys high in nickel are melted without a flux, the surface oxidizes long before the actual melting begins. Then, after the temperature reaches the melting point of the nickel, the oxide on the surface of the individual pieces prevents the union of the liquid metal, or if the temperature is raised still higher, the oxide itself melts and causes the mass to become thick. When copper is present, as it is in "Monel-Metal," the condition is even worse, as oxide of copper dissolves in molten copper or nickel. It will readily be understood, therefore, that melting nickel or alloys high in nickel without a flux causes oxide to form on the surface which prevents the union of the molten metal.



Sketch Showing Method of Melting Monel-Metal.

When a flux is used in melting, the oxide formed on the surface is dissolved and the clean, molten metal thus exposed is free to unite; and at the same time, there is less oxide absorption and the metal, if thoroughly melted, is not thick. It is frequently found that "Monel-Metal" will not run although the temperature may be sufficiently high. This is caused by the presence of oxide, and the use of a flux will obviate it and produce such good results that one may actually believe that the metal melts at a lower temperature when the flux is employed.

In melting small quantities of "Monel-Metal" a crucible furnace should be used and the crucible itself should not be too large. Small crucibles give better results, as the length of time it takes to melt is then shortened. There is then less oxidation. By small crucibles are meant from No. 25 to 55, although if a good furnace is used that is capable of giving a high heat, larger ones may be used with satisfactory results. Owing to the difficulty in obtaining the necessary heat in ordinary furnaces, small crucibles, when they hold sufficient metal, for pouring the casting, will deliver the molten metal in less time. If furnaces are used in which it is impossible to use small crucibles, then a less quantity of metal should be placed in them than used for regular melting. This has been found to give good results.

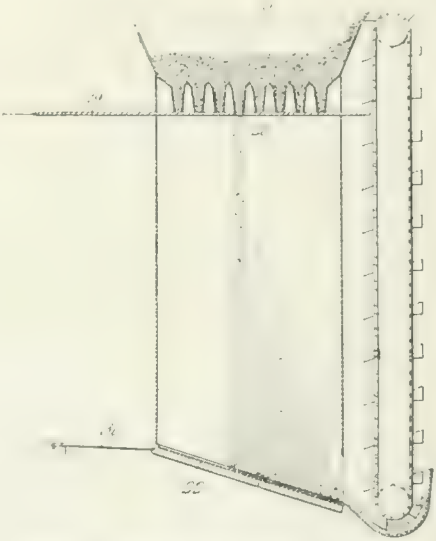
The flux used in melting "Monel-Metal" may be any of the well-known substances used for such purposes, but it is necessary that it be of such a character that no foreign substances will be introduced into the metal. Borax or a mixture of fluor-spar and lime is excellent and a pound or two is added to the crucible when it is placed in the fire with the metal. The method which gives the best results is that indicated in the sketch. The "Monel-Metal" is covered with flux, and then charcoal used for the covering. If desired, the charcoal may be omitted, but it acts in a beneficial manner in preserving a reducing atmosphere inside of the crucible.

When a flux is used in melting "Monel-Metal," the metal apparently melts without difficulty if the heat is sufficiently high, and the metal becomes liquid and runs freely in the mold. It is usually necessary, in order to obtain sound castings free from blowholes, to use a small amount of some dexoidizing agent before pouring, otherwise the metal is apt to contain gas which results in the formation of cavities in the castings (blowholes).

It is a mistaken idea that metallic radium is an article of commerce. It is never seen. The salts (generally the radium chloride) are the materials obtained and used.

Finishing Metal Surfaces by Steel Balls.

A process for finishing metal surfaces by means of hardened steel balls has recently been patented by Ambrose Ridd of Newport, Ky. (U. S. Patent 937,180, Oct. 19, 1909). The method is herewith illustrated and is described as follows.



Manner of Finishing Metal with Steel Balls.

The metal sheet to be finished is at the bottom of a receptacle and steel balls are allowed to fall upon it. The balls are shown by 31 and flow through the outlet spout 20. By means of an endless conveyor, they are continuously elevated to the chamber from which they fall. By varying the height, the size of the balls, and the rapidity of fall, the finish on the sheet may be varied.

The process is intended more particularly for the finishing of Russia sheet iron, but may be used for any other kind of sheet as well.

All commercial nickel deposits contain iron as a small amount is carried over from the anode (all commercial nickel anodes contain iron). This slight admixture does not appear to injure the nickel deposit and renders it whiter than pure nickel.

An Old Brass Foundry.

When it is remembered that the first brass made in the United States was sheet metal, and that its manufacture did not date back further than 1824, it will be appreciated that the brass industry in our own country is not of an age that can be compared with that of England or other foreign countries.

We are indebted to Fred E. Newell of Central Falls, R. I., for the accompanying photograph of the former brass foundry of his father who started to make brass castings in it in 1845. It was originally a wash house but was altered into a brass foundry. The present brass foundry of Mr. Newell is now located in the same place.

It is believed that this brass foundry was one of the first in the United States, and it is, at least, one of the oldest, if not the oldest, of which we have any actual pictures. Until about a year ago the building was intact

The Antiquity of Solder.

In a reply to the paper on the surface appearance of solders recently read before the Institute of Metals in Manchester, England, and published in THE BRASS WORLD, November, 1909 page 400, Prof. Gowland made the following remarks:

The Antimony Fern Leaf and the Copper Furrow

Professor Gowland said he had occasionally to deal with solder in large or small quantities. The most ancient solder he had had to deal with was Roman solder which was dug out at Silchester. It dated from the year 300 A. D., and to his surprise he found by analysis that it had the same composition as the standard solder of the Plumbers' Company, namely, two parts lead and one part tin. Supposing 2 per cent. of antimony were added to solder in order to get proper appearance, what effect would that have upon the practical

The Old Newell Foundry in Central Falls, R. I. One of the First in the United States. Built in 1845.

properties of the solder? Was that solder equal to or better than that made with pure lead and pure tin? They all knew that in producing metals and alloys for sale it was a very important matter, at all events for the producer, that the metals have a presentable appearance. Certain appearances were demanded by the purchaser, and if the metals had not that appearance, then the price came down, notwithstanding that the metals might be commercially pure. They had good examples of that in regard to several metals, especially in the production of antimony. Unless the metal had a star, or fern leaves, well standing up on its upper surface, they could not sell it at its proper price, although it might be perfectly pure. It was well known, in fact, that pure antimony would not give that fern leaf appearance unless it was manipulated in a certain way. Copper ingots again, must have a level surface and a certain distinct furrow. That was a characteristic of pure copper; but the appearance could also be simulated in bad copper. Tin, on the other hand, was a metal which was extremely sensitive to impurities, particularly in regard to surface appearance. A very small amount of iron in tin would produce a similar effect to that which badly made solder had upon its upper surface. Instead of being resplendent and having a slight furrow, it would be covered with minute specks. That led him to ask the author whether the presence of iron in the tin would account for the appearance of the solder. The surface of mercury was a very good indication of its purity. If solder containing 2 per cent. of antimony were as useful in practice as solder made from pure lead and pure tin, manufacturers would all make that kind of solder and sell it.

Mr. Bannister, in replying, said he had not examined a 95-5 alloy. What was usually done in the case of those alloys was to take them down to 50-50 and then examine for impurities. In reply to Professor Gowland, he said 2 per cent. of antimony solder was not so good for practical purposes as solder which contained no antimony.

The best aluminum mixture for sand castings is one containing aluminum and copper and does not crack in the mold like the aluminum and zinc mixtures.

Ancient Brass.

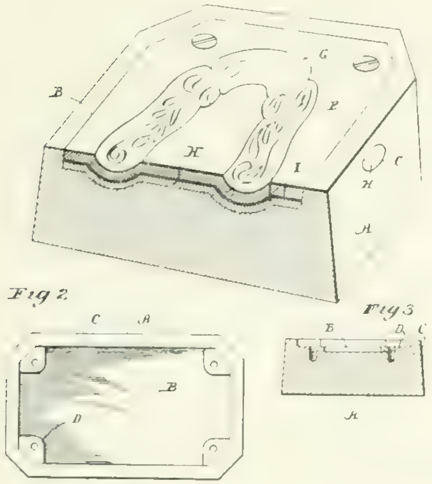
In the discussion of a paper read at the meeting of the *Institute of Metals* in Manchester, England, Oct. 14th and 15th, Prof. Gowland made the following remarks upon ancient brass and which are of interest:

As the history of brass had been alluded to, he might say that it was only within recent times that zinc had been separated as a distinct metal, but brass was made many centuries ago. The first brass that he had been able to find was a Roman coin of 20 B. C. From that time, for about two hundred years, the Roman-made coins consisted of from 75 to about 80 per cent. of copper, and the rest zinc. The Romans were not content with making coins, however; they also made ornamental brasswork, and brass was also used in the manufacture of armour. On examining a suit of scale armour, dating from the second century, he found it to contain about 80 per cent. of copper and the rest zinc. Some brass ornaments dug up at Silchester had the same composition. A great deal had been said about brass being known to prehistoric people. Recent investigations had shown that brass and filigree ornaments, supposed to date back to prehistoric times, belonged to post-Roman times, and from their analysis they appeared to have been made from Roman coins which had been melted down. When the Romans used brass they made it in the way referred to in the paper as calamine brass. They melted copper together with zinc ore (possibly calamine). That method of making brass was the only method which could be used until zinc was discovered and separated out. That old method of manufacture continued well into the last century, and was still practised in the 'fifties by Mr. Pemberton of Birmingham, England, the metal being sold by him as calamine brass.

A mixture of cylinder oil and asbestos is said to give results in babbitting superior to those of clay. It may be kept for a long time without change and is always ready for use. It is not gritty like clay, nor does it become heated like putty. It is used as the dam or plugging for holding the babbitt in place when it is poured into a bearing.

New Method of Making Dies for Silverware.

A new method of making dies for the production of silver and other varieties of metal wares has been patented by Frank H. Hotchkiss of Shelton, Conn. (U. S. Patent 939,505, Nov. 9, 1909). The die is made in parts as herewith illustrated. The object of the invention is to reduce the cost of a die.



Method of Making the Die.

The base A is made of iron or steel, either cast or wrought as may be desired. The die proper is indicated by G and is made of a bronze plate carefully fitted to the iron or steel base. It is fastened by screws. In this particular instance, the die is intended for making a small tray. After the die plate G has been carefully fitted to the base, soft metal, such as a hard babbitt or other tin alloy melting at a low temperature, is poured in the hold C at the side of the base. It is poured sufficiently hot to insure the complete union of the base and the die plate. In this manner the expense of a solid bronze die is obviated.

In the illustration the soft metal uniting the base and die plate is indicated by H and when properly filled, the die is said by the inventor to be sufficiently solid to stand the necessary strain in stamping metal goods like britannia-metal, silver etc.

Effect of Sea-Water on Metals and Alloys.

During the discussion of the paper "Constitution and Properties of the Aluminum-Copper-Tin Alloys" read by Messrs. C. A. Edwards and J. H. Andrew at the meeting of the Institute of Metals held in Manchester, England, Oct. 14 and 15, 1909, the following remarks were made and which are of interest:

Mr. Sinclair said that in testing many metals, two of which were alloys of aluminum and copper, he found that in sea water, suspended alone, the last named lost less in weight than any of the others he investigated. When treated as galvanic couples by placing different metals or alloys together he reached the astonishing result that an alloy of 10 per cent aluminum and 90 per cent of copper placed in contact with all the other metals he had experimented with was the only one which lost nothing at all. What astonished him most was the fact that fine copper of the highest quality placed against the 10 per cent. alloy lost considerably after twelve months' suspension in sea water.

Mr. J. Brentnall said that at one time, in making manganese bronze castings, he had considerable trouble in preventing them from leaking under pressure. At the last meeting of the Institute he met a gentleman who informed him that aluminum and tin together had a remarkable corrosive action with water, forming a sort of galvanic couple. He began to work on those lines—purely empirically. He took an alloy of 50 per cent. tin and 50 per cent aluminum, and he found that the action was remarkable; when copper was added the action was diluted until about 10 per cent of copper was reached, when it was scarcely noticeable at all. With larger percentages of copper the action, to the eye, was quite checked. Further than that, when he took the alloy of tin and aluminum and added zinc to it, the corrosion was immensely increased, until somewhere about 95 per cent zinc and 5 per cent of each tin and aluminum. The action was so great that if he took some turnings of the alloy and immersed them in water with apparatus for collecting gas above them, he could collect 250 c. c. of hydrogen gas in half an hour. That action, however, only went on for a short time, because its effect was to coat the alloy with hydrates or oxides of the metals. By adding a little caustic soda to the water, however, the hydrate of tin would dissolve out and the action be resumed. In answer to the President, Mr. Brentnall said he used pure water in these experiments. In conclusion, he appealed to other members of the Institute, with better appliances and more time at their disposal than he had, to continue the investigation.

Solder for Platinum.

Two solders for soldering platinum have been patented in France. They are as follows;

	No. 1.	No. 2.
Platinum	60%	25%
Gold	35%	50%
Silver	5%	25%

Fine platinum is used and the gold and silver are previously alloyed and rolled into sheet. The platinum is then wrapped up in this sheet, covered with borax and fused in the oxy-hydrogen blowpipe flame. The mass is then rolled into sheet and again fused and the operation repeated several times in order to render the whole homogeneous. The platinum recommended is called "platinum spangles" which is apparently platinum black that has been heated to redness or a similar form of the finely divided metal.

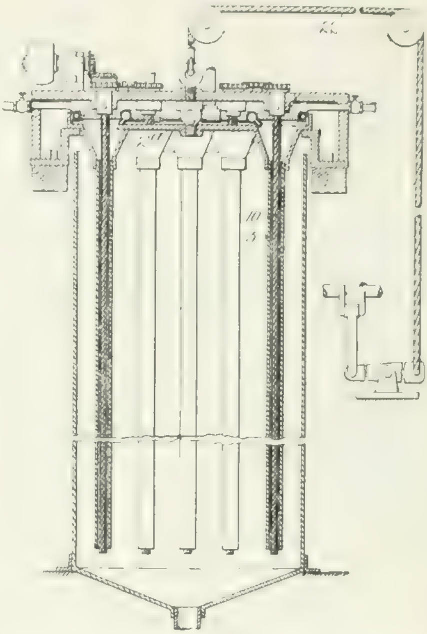
Investigation on the Corrosion of Soldered Joints.

In *Zeit. Angew. Chem.* 22, 1909, page 2042, A. Lippman gives the results of many examinations of defective soldered joints in electric wires and cables. His results show that the prejudice against ordinary chloride of zinc, used so extensively as a soldering flux, is not justified by the facts. He found that pure chloride of zinc was in every way superior to the compounds containing chloride of zinc and ammonium chloride (Sal-ammoniac.) When the sal-ammoniac is used the after effect in corrosion is even greater than when hydrochloric acid is used.

When ammonia is added to a chloride of zinc solution to neutralize the free acid in it, and then used as a flux, it was found that the corrosion was quite marked and increased in proportion to the amount of ammonia used. If caustic soda is used to neutralize the free acid in the chloride of zinc, the solution then becomes useless as a soldering flux.

Apparatus for Cleaning Iron Pipes for Electrogalvanizing.

An apparatus for cleaning metal pipes to be electrogalvanized has been invented by George A. Lutz of Plainfield, N. J. (U. S. Patent 939,608, Nov. 9, 1909). The apparatus is intended to clean the interior of the pipes. The pipes are shown by 5 in the illustration and are held rigidly in a receptacle of sheet iron.



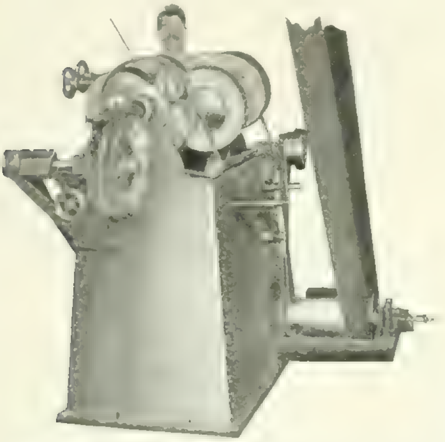
Apparatus for Cleaning the Inside of Iron Pipe.

Wire ropes are hung in the interior as indicated by 10. These ropes are fastened to mechanism operated by gears run by a motor so that they revolve. Through the funnel shaped tops 2a sand and water are fed. The spiral or screw-like shape of the wire rope causes the sand to scour the inside of the pipe as it turns. At the bottom the sand and water are recovered and may be used again.

Finely divided sterling-silver material, such as filings, chips, clippings, etc., should first be melted and run into ingots which are then remelted and poured into bars for rolling. If the melted chips or other finely divided material are poured directly into bars, they will not be sound or roll well.

A New Tube and Rod Polishing Machine.

A tube and rod polishing machine of entirely new principle has been placed upon the market by the Tube Bending Machine Co., 150 Mulberry St., Newark, N. J., and which will undoubtedly bring about a radical change in the methods now in use for polishing and buffing all kinds of tubing and rods.



Manner of Using the Tube Polishing Machine.

The machine is herewith illustrated and is composed of two buffing lathes mounted upon flexible supports. Each lathe carries two buffs. The tube is automatically fed through one head between the two buffing stands and out through the other head. The tube, by means of rubber feed rolls, is given a rotary motion and its entire surface is subjected to the action of the buffs.

The speed of the machine may be varied to suit different kinds of work and the size of the tube. At present, it will take tubing from ¾ to 2½ in. outside diameter, and without any change. A unique feature of the machine is in the fact that the tubing is fed continuously. By means of a sleeve, each length of tube is joined to the next, so that there is no necessity for stopping the machine. It should be noted that the tube is both cut-down and buffed in one operation as one set of buffs at the feeding end performs the cutting down, while those at the delivery end do the buffing. The tube is delivered finished. The additional buff at the front, as shown in the illustration, is used to color the tube when desired. The tube is thus delivered ready for lacquering or plating.

Brass bedstead manufacturers, makers of lavartory fittings, bath room fittings, and others who have occasion to polish tubing will find the machine capable of turning out a large quantity of work per day with unskilled labor and of high finish. Its advantage over hand polishing and buffing needs no argument.

An Improved Borax Flux for Hard Soldering.

An improved borax flux for hard solder has recently been patented by Wilhelm Ackerman of Berlin, Germany. (U. S. Patent 940,111, Nov. 16, 1909). It is made by heating 3 parts of ordinary crystal borax and 1 part of boracic acid together so that the whole gently melts into a clear, thick syrup. The flux is used in this condition and is not dried.

The advantage claimed for such a flux is that it will remain a long time without drying and is easily applied to the surface to be soldered and to which it firmly adheres so that when the blowpipe is applied, it will not be blown off. In addition, it is easily removed after soldering as it usually cracks off of its own accord, and if not may be readily washed off. It is also claimed that the flux does not swell like crystal borax, but fuses down at once to a clear glass. When applied to a metal, it forms a varnish like coat that is adhesive and acts the part of a true flux. The compound is analagous, the inventor states, to water glass.

Cast-Iron for Molds.

According to a writer in the *Foundry*, cast-iron for molds should contain a very low amount of sulphur and phosphorus. Charcoal iron is the best for the purpose. The following is an analysis of an excellent iron that showed a long life when made into molds:

Graphite	3.393
Combined Carbon	0.577
Silicon	1.270
Manganese	1.200
Sulphur	0.004
Phosphorus	0.147

In some cases, from 5 to 8 per cent of steel scrap may be used to a good advantage with the iron.

Electro-Cementizing or Annealing, Cleaning and Zinc Coating Wire at the Same Time.*

By Alfred Sang.

Iron or steel wire for fencing, barb-wire and wire goods of various kinds, are usually zinc coated by the following method: The wire is drawn successively through:—

First, a tubular annealing furnace of considerable length,

Second, a solution of hydrochloric acid which removes scale and the carbon left by the burning of traces of wire-drawing grease,

Third, chloride of zinc, or else a mixture of sal-ammoniac and glycerine floating on the surface.

Fourth, a bath of molten zinc at a temperature of about 500° C. and

Fifth, wipers (made of asbestos pads pressed together by vertical screws), and thence through water to the take-up frame.

These five operations of annealing, cleaning, fluxing, coating and wiping must be controlled within definite limits; any single one of the many possible errors of manufacture will affect the quality of the product.

The drawbacks inherent to the hot process as applied to wire are five in number:

First, the annealing is imperfect;

Second, the acid bath causes the absorption of hydrogen, which not only hardens the surface, but promotes subsequent corrosion and prevents the intimate adherence or alloying of the zinc to the iron;

Third, the flux causes pockets to form between the zinc and the iron, in which traces of chlorides are imprisoned and assist corrosion; the wiping destroys the pockets themselves, leaving areas where the coating is practically non-adherent;

Fourth, the zinc deposited is high in iron and therefore more readily scaled off than pure zinc and sooner destroyed by moist air and other agencies;

Fifth, the wiping is difficult to control; if too close it will very often cause streakiness, the protection to the iron being that afforded by the amount of zinc at the thinnest spots; if the zinc is wiped too cold there occurs a transversal crackling not unlike the hair-cracks in a troweled surface.

The hot process is not a simple one, and an expert wire galvanizer is a valuable specialist. It only appears simple and advantageous as compared with more recent processes, because there are two generations of experience back of it.

The interest recently shown by the United States Department of Agriculture, and the investigations which are being also carried out by leading wire manufacturers, indicate that there is a demand from farmers and others for something better than the present grade of galvanized wire. In the hope of helping the question and of drawing attention to what is probably a new field of experiment, I submit the following process, which has been tested in a modest way, and, it is hoped, will soon be tried, for a verdict of life or death, on a small commercial scale.

The claims to attention possessed by this process are its comparative simplicity, the fact that it lends itself to scientific control and the quality of the product. I seriously doubt if it can equal the low costs for hot galvanizing under conditions as they now exist, unless it be applied on a very large scale.

The principle involved in this new process, which I have called "electro-cementizing"—cementizing being the process of depositing metals by cementation, of which sherardizing is a form—is by no means new. We find in the *Bulletin de la Societié de Chimie et de Physique for the year 1805, page 371*, that M. Dumas has found a means of zinc-coating iron by burying it in oxide of zinc and powdered charcoal and heating it to redness. Since then, many processes depending on the reduction of oxides or oxidized dusts in contact with the articles to be coated have been tried, usually with indifferent success.

The novelty of electro-cementizing consists in the method of heating by electricity, the heat being directly applied to the articles by using them as resistance. On the very face of it, it is only applicable in practice to articles of small cross-section, such as wires and strips, although in theory it may be applicable to larger goods, and if carried out on a very important scale could undoubtedly be applied to thin sheets and tubes.

Referring to the diagram: the coating chamber or furnace (1) is built of iron plates and lined with refractory material as used in zinc smelting furnaces; it is filled from the top with a mixture of crushed coal and oxide of zinc. The wire comes off the reels (2) and passes over and around brass contact sheaves (3) which are equal in number to the strands of wire which the furnace will treat at one time, and are mounted tight on a common shaft from which they are insulated by non-conducting bushings. This shaft, by revolving, leads the wires and relieves the tension on them. The single sheaves at each end of the shaft (4, 4') are connected through the proper rheostat to the poles of a suitable transformer supplying alternating current at a low tension which may be varied within certain limits. The intermediate sheaves are paired by means of common hubs so that the current may pass freely from one to the other in each pair.

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*A paper read at the meeting of the American Electrochemical Society held in New York City, Oct. 28th and 30th, 1909.

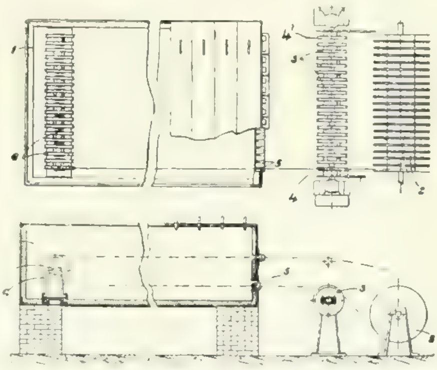
The wires now pass between the hinged aprons or flaps (5) and into the lower part of the furnace, then over another series of sheaves (6) inside and at the rear end of the furnace, these sheaves being similar in every respect to the double sheaves on the outside, but staggered in relation to them, by which is meant that the near sheave of each outside pair is in line with the far sheave of each inside pair; the wires then return through the upper part of the furnace and through a second set of hinged flaps, to the take-up frame, which would, if shown in the drawing, stand to the right of the paying-out reels. The valuable idea of bringing the wire back through the upper part of the furnace was suggested to me by Mr. Hadaway of the Westinghouse Electric & Mfg. Company.

The entrance and exit flaps will allow the passage of the loops which connect successive strands end to end; the material falling through these openings will be collected and fed back to the furnace.

When all the strands of wire are in place and connected, therefore, in series, the current will pass zig-zag-wise in and out of the furnace and a wire resistance of considerable length will thus be afforded. The entire system forms a resistance grid on a very large scale.

As the heating up is necessarily rapid and as no useful purpose can be served by maintaining the full temperature once it has permeated the wire, it is probable that a very short furnace will suffice, in which case it would be necessary to alter the design of the plant in order to afford the wire a sufficient length of time to cool in a non-conducting medium and out of reach of the air. As it leaves the furnace the wire might be led to the take-up reels through tubes, in order to prevent chilling.

If for any reason a wire breaks or pulls out the simplest thing in the world to do is to cut it out entirely and connect up the sheaves between which it ran by a copper conductor or a standard resistance on the outside, until such time as the furnace is closed down for cleaning, inspecting or repairing.



Sang's Apparatus for Electro-Cementizing Wire.

The details of the operation may be described as follows: The wire is quickly brought to a bright cherry-red, at which temperature all grease is volatilized, scale or rust is reduced by the carbon and occluded gases are driven out; at the same time, the zinc oxide in immediate contact is reduced and, as vapor, soaks into the "pores" of the metal, which are well opened by the heating, and condenses on the surface as the heat drops. As the wire returns through the upper part of the furnace it cools down slowly from a temperature considerably above its recalescence point, so that it is annealed. With low-carbon steels an excess temperature of annealing of two or three hundred degrees is not likely seriously to affect the quality of the wire. The coating is of the color of freshly electrodeposited silver. The quality of the product is mostly due to the alloy of zinc and iron, as I have pointed out elsewhere, iron which has absorbed an almost infinitesimal amount of zinc by being exposed to zinc vapor in a reducing atmosphere, is most difficult to corrode and resists a solution of hydrochloric acid in a most remarkable manner.

The oxide and finely-divided carbon form a non-conducting mass, and the heat emanating from the wires will accumulate in the furnace until a constant temperature, not far below the reduction point of the oxide, will be reached; this will greatly reduce the amount of current required to operate the process. After the operation is under way, the resistance of the hot wires will be much greater than that of the cold wires.

Most of the time consumed in "sherardizing" is spent in forcing the heat from the outside through a non conducting mass of zinc dust; in the meantime, most of the heat-units go up the flue. The thermal efficiency of electro-cementizing is better and will go far towards balancing the excessive cost of electric heat.

It appears, therefore, that the new process would combine in itself the annealing furnace, the cleaning process and the zinc bath and do away entirely with the fluxing and wiping. While the cost of the heating will surely exceed that of the hot process, at least until the furnace has reached its constant temperature, the costs of installation, maintenance and depreciation, taken in one with the other, will probably be lower than for the hot plan, the cost of the zinc will be much less, standing at about 3½ cents on a 5 cent spelter market with less waste and the labor cost, if at all, in excess of what it is at present; the wire will run more slowly, but there will be a compensating increase in the number of strands.

A serious objection has been offered with regard to the temperature of the wire. The estimated maximum temperature of 900 degrees C. is high, and there is undoubtedly danger of the wire breaking inside of the furnace, or at least being elongated; most galvanized wires are of small gauge, No. 12, for instance, being a very important size. The driving of the coldest sheaves is calculated to relieve the tension created by the take-up reels and breakage from sag need hardly be feared and could easily be prevented. However, the criticism is a very legitimate one; trial on a commercial scale will reveal the problem, if it exists, and it can then be attacked and, I believe, successfully solved. The mechanical and electrical elements of the process are by no means complicated, and the most valuable criticisms and hints will come from those who know, from their experience with zinc reduction furnaces, what is likely to take place inside the coating chamber.

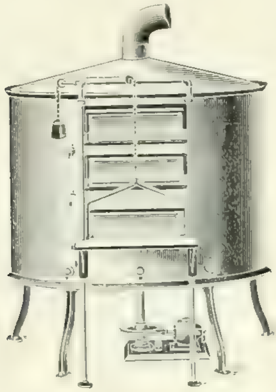
Oxides of other metals besides zinc may be used. Zinc dust, with which I carried out my first test, deposits zinc at a much lower temperature, and might be useful for wire which must not be annealed, but its use is open to many serious objections. It is costly, and by aging it becomes in part converted into the carbonate of zinc, which requires a higher temperature of reduction at which, unfortunately, carbon dioxide begins to act and, unless special precautions be taken to maintain an atmosphere rich in carbon monoxide, the result is a gray coating of mixed zinc and zinc carbonate which suffers further decomposition, until, after a few months, it crumbles when the articles are hammered or bent. All dark colored sherardizing is more or less in this condition, and the sulphate of copper test, to which inspectors cling as to a fetish, is worthless as a test quality, its limited value being in connection with coatings of zinc and not of zinc carbonate. Again, the use of zinc dust requires an air tight furnace, which in itself would suffice to make the process uncommercial.

Zinc oxide, on the other hand, having a zinc content of 80 per cent., is an intermediate product in the manufacture of spelter, does not require an air tight furnace, is not injurious to the workers, like zinc dust, and does not deteriorate, nor, on account of absorption of hydrogen from moisture, call for restrictions, in respect to its storage, by fire insurance companies. Most important of all, its reduction yields a coating of pure distilled zinc which is thoroughly alloyed to the metal underneath.

An excellent red-brown color can be obtained on yellow brass goods by immersing them in a very strong and hot caustic potash solution for a short time and then scratch-brushing when dry. The stronger and hotter the solution the more rapidly the color is formed. With weak potash solutions it forms slowly. Caustic potash may also be used but it does not work as rapidly as the potash.

The Cullen-Atkinson Revolving Core Oven.

A core oven for drying or baking sand cores and for use in other kinds of work, such as lacquering and enameling, when slightly modified, has been placed upon the market by the Cullen-Atkinson Co., of 120 Allyn St., Hartford, Conn.



Cullen-Atkinson Core Oven.

The valuable and unique feature of the oven lies in the fact that the shelves holding the cores revolve so that any particular core may be readily obtained. The shelves in the oven herewith illustrated are revolved by a motor, but other forms of power may be used when desired. The oven was designed for use in one of the large establishments in New Britain, Conn., and in which it has given excellent satisfaction.

A New Aluminum Solder.

A new aluminum solder has been patented by Louis Goppman of Pittsburgh, Pa. (U. S. Patent 939,494, Nov. 9, 1909). It consists of the following:

Tin	40.05%
Lead	20.06%
Zinc	20.31%
Antimony	3.43%
Copper	1.10%

The above proportions are given as stated in the patent, although they do not add up to one hundred per cent. It would appear that the mixture resulted from an analysis of some material.

A Simple Apparatus for Making Castings Under Pressure.

A simple apparatus for making castings under pressure has been patented by Orrin J. Sayers of Cleveland, Ohio, (U. S. Patent 937,964, Oct. 26, 1909) and which is herewith illustrated in Figs. 1 and 2. The process is intended only for the production of small castings.

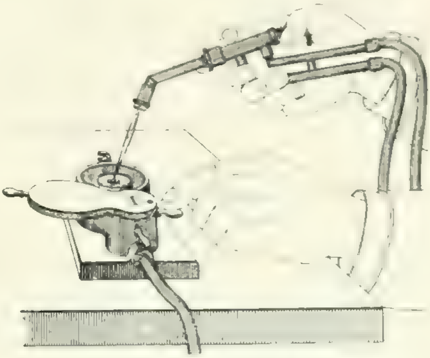


Fig. 1. Manner of Melting the Metal.

In Fig. 1 is shown the manner of melting the metal and closing the cover of the compartment to which pressure is applied. In Fig. 2 a cross section is shown. The metal to be cast, usually gold or silver, is placed in the mold 31. The metal is indicated by 33. The metal itself is melted by a blowpipe as shown in Fig. 1. When fused, the cover of the apparatus is released by the finger and is closed by the spring. At the moment it closes, the inlet valve is opened and air pressure is applied to the chamber so that the metal is forced down into the mold cavity. A vent at the bottom of the mold allows the air to escape. By making the bottom of the mold of coarse material, the air will pass through when the pressure is applied.

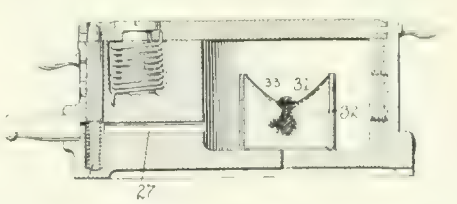


Fig. 2. Cross Section of the Apparatus.

Casting Hollow Brass or Bronze Balls.

A method of casting hollow brass or bronze balls has been patented by Ambrose Casey of the Goulds Mfg. Co., of Seneca Falls, N. Y. (U. S. Patent 935,741, Oct. 5, 1909). The manner in which the balls are cast is herewith shown.

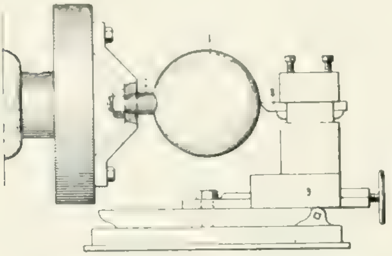


Fig. 1. Method of Turning the Pattern.

The pattern is made in a manner that insures an almost perfect sphere. In Fig. 1 is shown the wood pattern fastened to a face plate of the lathe. The tool is mounted upon a rotating carriage 9 so that the pattern cannot be turned other than spherical.

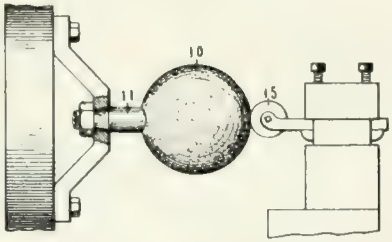


Fig. 2. Grinding the Core Spherical.

The core must also be round in order to produce even walls in the casting. The core is made of sand in the usual manner and then placed in a lathe shown in Fig. 2. The surface of the core is then ground down by an abrasive wheel 15 and a spherical contour produced.

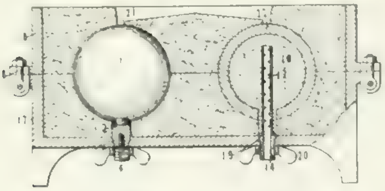


Fig. 3. Manner of Casting the Balls.

The method of casting the ball is shown in Fig. 3. The core is fastened to the bottom of the flask by a thumb nut 20 and a core vent 14 extends to the bottom to carry off the gas from the core. Gates 21 and 22 serve to feed the fastenings which, in this instance, consist of two as shown.

Lacquering or Varnishing Metal Goods by Tumbling.

According to a recent invention of George H Hardman of New Bedford, Mass. (U. S. Patent, 940,593, Nov. 16, 1909) small metal or non-metallic articles may be lacquered or varnished by tumbling in the following manner:

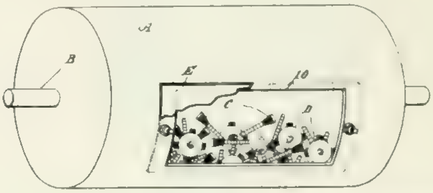


Fig. 1. The Tumbling Barrel with Reservoir Balls.

The articles are placed in an ordinary tumbling barrel as shown in Fig. 1. A ball shaped receptacle shown in Fig. 2 is provided with brushes on the sides. The ball may be made of metal or glass and is filled with the lacquer or varnish. It is placed in the tumbling barrel with the articles and tumbled with them. The lacquer or varnish oozes out of the brushes and coats the articles as they are tumbled. An excess is thereby avoided.

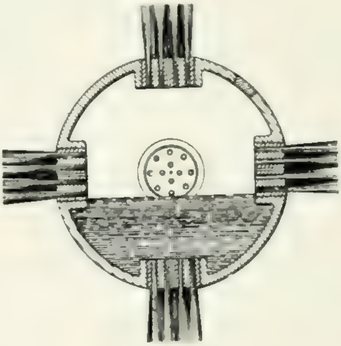


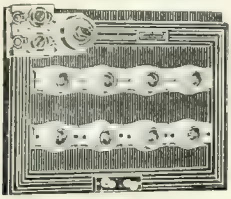
Fig. 2. The Reservoir Ball.

As a flux for molten aluminum, chloride of zinc has now become a standard material.

Whitley's Coloring and Stripping Board.

A useful and inexpensive coloring and stripping board for use in electroplating is being placed upon the market by Alfred Whiteley, 52 John St., New York City. The board is herewith illustrated. It is intended to supplant the more expensive rheostat.

The board is for use in reducing the ordinary electric light current to the amount necessary for plating and stripping work. The operation is simple By means of a snap switch and terminals the board is connected to the city current (which must be the direct and not the alternating currnet, of course,) so that when not in use, the current may be shut off and no expense is incurred. Bulb lamps of varying size are screwed into the sockets, and by means of binding posts shown at the bottom, the tank is connected.


Whiteley's Coloring Board.

The lamps reduce the current, in ordinary cases where the 110 or 118 volt circuit is used, to about 5 amperes and from 5 to 10 volts, but it may be regulated as desired. It will be readily understood that the board gives a simple means of using the lighting current for plating

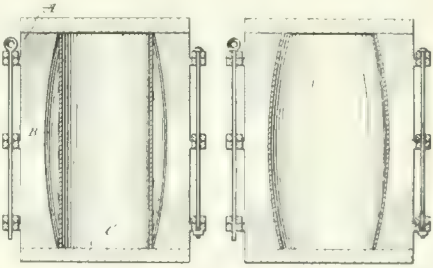
Making Metalized Flowers.

According to a French patent recently issued, metalized flowers are produced in the following manner: If a rosebud is to be metalized, the stem is replaced by a metal pin inserted in the calyx nearly to the top of the flower. The bud is then hardened by immersion in an alcoholic solution of shellac made by dissolving 6 oz. of shellac in 1 quart of alcohol. After drying for half an hour it is again immersed in the shellac and then completely covered with bronze powder by dusting over with a brush. After further drying it is submitted to the electroplating process.

An acid copper solution is used and a copper deposit is given the bud. The pin serves as the connection. The bud thus copper plated is washed in hot water, dried in hot air and then freed from vegetable matter by heating over a Bunsen burner. Finally the surface is cleansed by a three hours soaking in dilute muriatic acid (part of acid to 4 parts of water). This is followed by washing and immersion in a potassium carbonate solution to neutralize the acid, then by washing again It is then dipped into a mixture of 3 parts of nitric acid and 1 part of sulphuric acid to brighten. The connection between the stem and flower is next made rigid by a plaster moulding when it is tinted to any desired color by means of colored lacquers.

Forming Sheet Metal Goods by Explosives.

A novel method of making hollow sheet metal articles without the use of expensive machinery has been patented by I. N. Jones of Defiance, Ohio (U S. Patent 939,702, Nov. 9, 1909). The process consists of placing the sheet metal, as shown in the illustration, in the interior of a cast-iron mold, inserting an explosive, closing the ends of the mold and then firing the explosive. The sheet metal is then forced against the sides of the mold and is formed into the desired shape. If desired, in order to prevent the fatiguing of the metal, the sheet may be forced by the explosive in successive steps, followed by a succession of annealings.



Method of Making the Article in the Molds.

In the illustration the appearance of the mold and the sheet, both before and after annealing is shown. The lid of the mold need not be fastened down, but is prevented from flying by an attached chain In the illustration a sheet steel barrel is shown as the article that is being made.

Questions and Answers.

Question No. 724. What is the "Japanese finish" as applied to lamps, statues and hardware generally, and how is it done?

Answer. The genuine Japanese-bronze, as found on bronze made in Japan, has a dark, mahogany color that is quite beautiful and has been the means of rendering this ware so popular. The finish on the genuine goods from Japan is not produced in the manner used in this country, nor could it be used. The color is given to the surface of the bronze by means of certain juices from plants and trees which not only have the property of coloring the bronze, but of lacquering it as well. The process of lacquering was described in The Brass World, April, 1907, page 129.

The method followed in the United States and other countries (except Japan) for producing the so-called Japanese-bronze finish (frequently called "Jap" finish) is by the use of liver of sulphur on the copper plated surface. The article to be given the finish is first copper plated with a rather heavy copper deposit (from thirty minutes to an hour deposit is satisfactory and longer does no harm) and then, after rinsing, immersed in a weak liver of sulphur solution. This solution is made by dissolving 1 oz. of liver of sulphur in 5 gallons of water. It is used *cold.* Immerse the article in the solution and watch the change in color on the surface. At first there is a sort of iridescent color which appears on the surface, but it soon changes to an even red, then darker until a dark, mahogany color is produced. During the immersion the article should be moved about. When the dark red color has arrived on the surface, immediately remove the article, rinse in cold water, then in hot water and afterwards in a weak acid pickle to "set" the color. The pickle is made by adding 5 oz. of oil of vitriol to 1 gallon of cold water. The object of this pickle is to "set" the color and prevent it from becoming darker upon standing. Its use is quite advisable in this work on account of the difficulty of maintaining the right shade of color. After immersion in the pickle for a few seconds, the article is rinsed and dried in sawdust. Then scratch-brush *dry* with a soft, brass scratch brush to bring out the lustre of the finish. A few trials usually will suffice to produce the right shade. If carried too far in the liver of sulphur solution, the color will be too dark.

Question No. 725. We desire to know if a barrel could be lined with block-tin sheet so that spring water could be shipped in it. We are shipping spring water in glass carboys and the breakage is enormous. Unlined wood barrels impart a taste to the water. Brass, copper or other kinds of sheet metal will not answer as they are acted upon by the water. It occurred to us that possibly block tin would answer as it is not acted upon by water. We understand that a worm of block tin pipe is used for the condenser in distilling water and that the water which condenses in it is pure.

Answer. Block-tin (which, of course, is pure tin) is not acted upon by pure water, and what you say about its use in distilling water is correct. There is one difficulty, however, in the use of the sheet for lining the barrels, and that is the tendency of the tin to crystallize while in service. This is particularly true in the case of such thin sheet as you would naturally use in lining the barrels. The constant bending that the sheet receives in service will soon serve to crystallize it and cracking will result. This has been quite well demonstrated in practice as we recently found an instance in which the crystallization took place. For a tank which is not to be shipped, block tin answers well for lining, but it should be used as thick as possible.

Question No. 727. What is the best method of introducing small quantities of copper (say from 1 to 4 per cent) into tin and lead alloys (solder)?

Answer. The copper should be introduced into the alloy in the form of the so-called "hardening". This is made by melting equal parts of copper and tin together and then pouring into ingots. These ingots are brittle and may be easily broken. To introduce a certain amount of copper into the solder, take twice as much of the hardening as you desire of the copper. For example, let it be assumed that you desire to add 2 per-cent of copper to 100 lbs. of half and half tin and lead solder. Then take the following:

Tin	46 lbs.
Lead	50 lbs.
Hardening	4 lbs.

The hardening, of course, contains the same amount of tin as copper so that less tin is used in the solder mixture. The object of making the hardening is to produce an alloy of the tin and copper that will melt easily at the temperature at which solder is made. Were the copper to be melted with the solder alone, so high a heat would be required that the tin and lead would be injured by oxidation. We do not understand what your object is of adding copper to solder. It does not improve it. In fact, it is injured by it as the molten solder containing considerable copper runs quite sluggishly.

Question No. 728.. Our nickel solution has worked all right until recently, but now we find that the work is coming dark and frequently quite black on the edges and sharp corners, although the rest of the surface seems to be good. We are not plating nearly as much work as previously; and, therefore, it would seem to us that, inasmuch as we are not working the solution "hard", it should turn out better work. We thought that the solution might be at fault, so we threw it away and then made a new one, but with the same results. Where is our difficulty? Is it in the salts or anodes?

Answer. Your difficulty is not in your solution or anodes, it is in the current. Your current is too strong and you are burning your work. Your current was apparently adjusted for a large quantity of work in the tank, but now you have reduced the amount. The remedy is easy. Cut your current down so that the work does not turn black on the edges and you will have no further difficulty.

Question No. 729. What is the cause of leakage in steam metal valves when pressure is applied to them? Our waste from leakage in testing is from 10 to 20 per-cent. We cannot understand why it should be so. Some of the castings have an almost perfect surface, and yet they leak when pressure is applied. Others are dirty on the surface and one would say that they also would leak, but they do not. We cannot understand why this should be.

Answer. Leakage in valve castings is almost invariably caused by the presence of minute particles of dross (oxide) in the metal. If you will notice the position of the leak on the castings, you will find that it usually occurs nearest the gate in the thin portion of the valve body; that is, it is more frequently in that place. Particles of oxide mingled with the metal, and which cannot be seen with the naked eye, are sufficient to cause a leak. They form channels through which the leak can occur. The remedy is, of course, difficult. The composition of the metal, the pouring heat, manner of gating etc., all influence the result.

Question No. 730. What is the cause of blistering in copper plating antimonial lead castings? We use a hot copper and it stands about 15 degrees Beaumé. We have tried all kinds of cleaning but without results. In all cases (in some worse than others) the blisters make their appearance.

Answer. The cause of blistering in plating your antimonial-lead castings in a hot copper solution is the presence of too much free cyanide in the solution and too strong a current. Add water to your solution to reduce it to 6 or 8 degrees Beaumé and run with a weak current so that the gas does not come off the work but very slightly. If much gas is given off, the deposit will surely blister.

Question No. 731. Will pure nickel stand sea water without corroding?

Answer. While pure nickel is very slightly attacked by sea water, it is corroded in time and a faint, green coating is formed on its surface. This takes place only after a long time.

Question No. 732. What causes pin-holes in crucibles? While we are not troubled with them to any extent, we occasionally find them and are at loss to account for them. They seem to occur on the bilge at about level with the top of the coke, and when the crucible is removed from the fire, drops of metal ooze out.

Answer. The cause of pin-holes is not well understood. They may be caused by the presence of minute cracks in the crucible, the existence of a particle of foreign matter, such as a splinter of wood in the crucible mixture, or an air bubble. Much thought has been given to the matter by crucible makers, but they have not completely eliminated it, although it occurs much less frequently than at one time. It is a subject for extensive investigation.

Question No. 733. Is pure nickel sheet manufactured in the United States?

Answer. As far as known, there is no one making pure nickel sheet in the United States although some of the Naugatuck Valley brass manufacturers attempted it some time ago with unsatisfactory results on account of the cracking of the plates in rolling. There is only a small demand for pure nickel sheet and nearly all consumed is now imported from Germany.

Question No. 737. We wish to place on the market an inexpensive agricultural oiler with a copper plated finish. The oilers are made of sheet steel. We wish to have as bright a plate as possible without buffing the copper. We are now operating a cyanide copper solution on our higher priced oilers and are buffing them, but we desire to avoid this expense if possible.

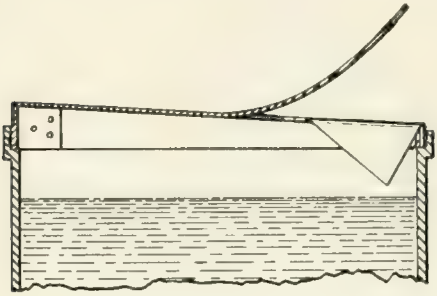
Answer. We fear you will not be able to obviate the buffing. Bright deposits can only be obtained when the surface underneath is also bright, and this would mean that you would have to polish the steel, an expensive operation. It may be possible that your copper is not working as it should. It is possible, by the use of a good solution, to obtain a fairly bright and uniform deposit that might answer for your work. Use a hot cyanide copper solution standing at about 5 degrees Beaumé and see if you do not obtain better results. If you use about 2 oz. of bi-sulphite of soda to the gallon it will give a clean, uniform deposit.

Question No. 738. In the use of the hydrometer in a silver solution, does the silver affect it or is it the cyanide? By adding chloride of silver, will the hydrometer go up or down?

Answer. Any addition to the solution will cause the hydrometer stem to rise and with it a correspondingly higher reading on the scale. It is not affected any differently by cyanide than it is by silver. For this reason the hydrometer does not indicate anything except the density of the solution. Should you add common salt or sal soda to the solution, the hydrometer would rise just the same.

Patent Abstracts.

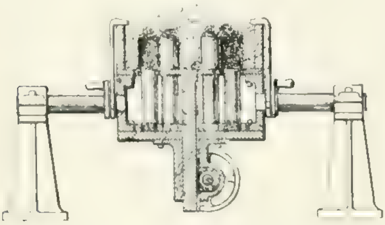
938,555, Nov. 2, 1909. COVER FOR TANKS USED IN SKIMMING SULLAGE FROM CRUCIBLES INTO WATER. William H. Carpenter of Bristol, Conn. Assignor of one half to A. L. Haasis of Brooklyn, N. Y.



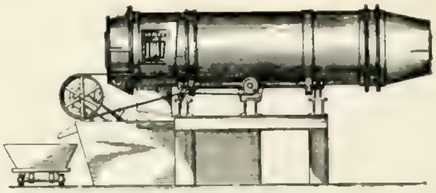
A sheet iron cover for the skimming tank made by the Metal Dross Economy Co., of Bristol, Conn. The front of the cover is cut out and the flap bent up as illustrated. The object is to protect the operator from the spattering of the water as the dross is skimmed into the tank.

937,477, Oct. 19, 1909. CASTING APPARATUS. Isaac Shonberg of New York City. An apparatus for casting soft metals in a mold under pressure. The feature of the invention lies in the mechanism for closing the mold, locking it to the casting spout and the injection of the metal into the mold.

939,030, Nov. 2, 1909. MOLDING MACHINE. Charles W. King of Birmingham, Ala. A machine for molding plumbers' brass ferrules. The use of a baked core for forming the inside of the ferrule is not required when the machine is used, as a green sand core is formed by it. A cope smaller than the nowel is used so that there is no necessity of matching the parts. A sand joint is thus obtained.

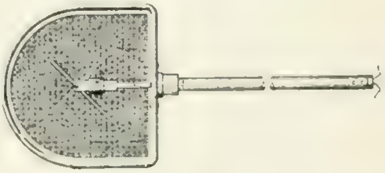


940,280, Nov. 16, 1909. ANNEALING AND HARDENING FURNACE. Walter S. Rockwell of New York City. Assignor to the W. S. Rockwell Co., of the same place. A rotary annealing or hardening furnace with a helical lining and internally fired by oil or gas. The work to be annealed or hardened is automatically fed in at one end, and gradually passes through the furnace by being forced along by the lining. It is then dumped into oil, water or other liquid as may be desired, or left without quenching.

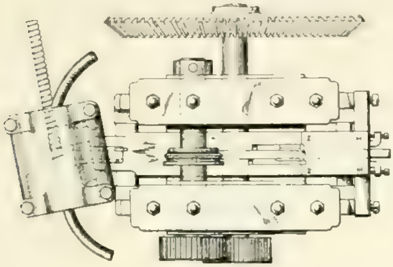


940,179, Nov. 16, 1909. ENGRAVING MACHINE. Peter J. Meyer of New York City. An engraving machine intended more particularly for engraving numbering machine blanks. The features are: The work may at all times be moved without altering the engraving tool, means for regulating the pressure of the engraving tool on the work, and simplicity of working. The machine is of the pantographic type.

939,918, Nov. 9, 1909. ENAMELING POWDER DISTRIBUTER. William Lindsay of Chicago, Ill. A device for evenly and uniformly distributing the enameling powder over an article to be enameled, such as a bath tub or cooking utensil. The apparatus is made with a sieve at the bottom through which the powder is sifted. An electrically operated magnet serves to shake the bottom without the vibration that is produced when the usual pneumatic shaking apparatus is used.

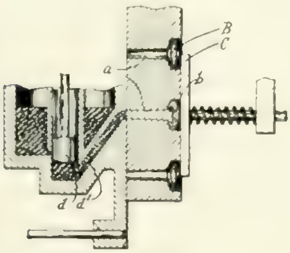


939,244, Nov. 9, 1909. APPARATUS FOR MAKING SPIRAL TUBING. Edwin T. Greenfield of Kiamesha, N. Y. A machine for making spiral, flexible metallic tubing. The feature of the invention lies in the method of avoiding the presence of flakes or burrs during the forming operation. While it is impossible to prevent the formation of the burrs, a stream of water is used to wash them away so that they will not injure the tubing.



938,634, Nov. 2, 1909. METALLURGICAL PROCESS. Anson G. Betts of Troy, N. Y. A process of reducing aluminum from its ore. The oxide of aluminum is reduced in an electric furnace with iron and an alloy of aluminum and iron produced. This is then heated with sulphide of iron to form a sulphide of aluminum. The sulphide of aluminum is then reduced to metal by a series of reactions given in the specifications.

934,940, Sept 21, 1909. BUTTON MAKING MACHINE. Edgar Shantz of Rochester, N. Y. A machine for making the shanks on the heads of metal buttons. The heads are fed, by means of a suitable device, to a duct connecting with a pot of molten soft metal, such as pewter. The metal is then forced through the duct to the head. The heads are recessed so that the shank will not pull out.



939,581, Nov. 9, 1909. MOLDING MECHANISM. William Zimmerman of Chicago, Ill. A device for drying sand molds in the foundry. It consists of an electrically heated coil which may readily be carried about and placed on the mold. By regulating the current, the heat may be varied.

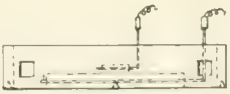


Fig. 2.

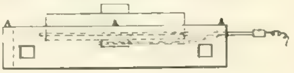


Fig. 3.

940,292 & 940,283, Nov. 16, 1909. SEPARATING NICKEL FROM NICKEL MATTE and RECOVERING HYDROCHLORIC ACID FROM NICKEL CHLORIDE SOLUTIONS. Horace L. Wells of New Haven, Conn. The nickel matte is heated with a hydrochloric acid solution containing not over 25% of acid when the nickel is dissolved and the copper left. The hydrochloric acid is removed from the solution and the nickel converted into sulphate by adding to the solution sulphuric acid and ammonium sulphate which form the double sulphate of nickel and ammonium, so that on account of the sparing solubility of this compound, it will crystallize out and leave the free hydrochloric acid for use again.

940,231, Nov. 16, 1909. WIRE TWISTING MACHINE. Louis Blessing of Jackson, Mich. A machine for twisting wire for use in making various articles known as "wire-goods". A gauge plate is used in order to make the twist tight or loose as may be preferred.

937,704, Oct. 19, 1909. MATCH PLATE FOR SAND MOLDING. John Lewis, W. A. Tenhagen and C. S. Reed of Cleveland, Ohio. A method of making a match plate for sand molding by using an outer or main plate of cheap metal, and an inner or pattern plate of an electrotype and which forms half of the pattern. Metal of an expensive nature is, it is claimed, saved thereby.

939,848 & 939,849, Nov. 9, 1909. FLASK FOR SAND MOLDS. The flask is provided in the cope with swinging or hinged sides so that it may be removed from the sand slip fashion. The same flask may, therefore, be used for a number of molds.

Trade Items.

The Triumph Electric Co., of Cincinnati, Ohio, have moved into their new factory at Oakley and are now employing 250 hands.

The Columbus Brass Co., of Columbus, Ohio have acquired the brick factory formerly occupied by the Farmobile Co., in that city and will occupy it.

The H. E. Wilson Motor Car Co., of Minneapolis, Minn., manufacturers of automobiles, are erecting a new factory 65 x 250 feet and four stories high.

The Wilkesbarre Metal Drawing & Stamping Co., of Wilkesbarre, Pa., have succeeded the Dion Mfg. Co., of that city and will manufacture stamped steel goods. The plant is on Pennsylvania Ave.

W. H. Oskamp, a stockholder in the General Sherardizing & Stamping Co., 2736 Colerain Ave., Cincinnati, Ohio, has applied for a receiver for the company. This company has carried on sherardizing for the trade.

Manning, Bowman & Co., of Meriden, Conn., have recently added a line of stoves, burning denaturized alcohol, to their products and which are to be used for cooking purposes.

A new brass foundry is to be erected in Mansfield, Ohio, by the Mansfield Brass Foundry, (J. H. Berry, proprietor) and which will be 45 x 161 feet. The foundry will probably be occupied by the first of the year.

A large block of stock in the Hamilton Watch Co., of Lancaster, Pa., has been purchased by Joseph Fahys & Co., the well known watch case manufacturers of Sag Harbor, N. Y. The new company will be represented on the board of directors.

The plant of the Carbon Stove Co., at Somerville, N. J., which was destroyed by fire some time ago, has now been rebuilt and is in operation. The nickel plating plant is also in operation. The concern is now known as the Somerville Iron Works.

The Allyne Brass Foundry Co., of Cleveland, Ohio, manufacturers of "Homogen", the new flux, announce to the trade that they will refund the purchase money if satisfactory results are not obtained with the first order purchased from them. They report gratifying returns from their business at the present time and customers are daily increasing. Brass founders should investigate.

The Metal Brass Economy Co., announce that recent sales of their skimming tank, for the saving of brass from skimmings, has been made to the Yale & Towne Mfg. Co., of Stamford, Conn., and additional orders received from the Rome Brass & Copper Co., of Rome, N. Y. The tank has given satisfaction wherever used, and has demonstrated that it is capable of saving large quantities of brass that in ordinary practice will be thrown away.

The Acorn Brass Co., has been incorporated at Winnipeg, Manitoba, with a capital stock of $20,000.

The C. J. Root Co., of Bristol, Conn., manufacturers of brass hinges, are obtaining estimates for a new plating and polishing plant.

The equipment of the Aluminum Co., of America at Connellsville, Pa., is being shipped to Clarksburg, W. Va., having been purchased for the United States Aluminum Co.

The capital stock of the Bradley & Hubbard Mfg. Co., of Meriden, Conn., manufacturers of lamps, fixtures and artistic metal goods, has been increased to $700,000.

The McCullough-Dalzell Crucible Co., of Pittsburgh, Pa., manufacturers of graphite crucibles, have awarded the contract for the addition to their plant. This addition will cost about $13,000.

The Maxwell-Briscoe Motor Car Co., are to erect a plant in Detroit, Mich., for the manufacture of automobiles. They now have plants in Tarrytown, N. Y., Newcastle, Ind., and two in Rhode Island.

The Acme Gas & Electric Fixture Co., has been incorporated in New York City by S. Wallach of 750 Sixth St., and others. The capital stock is $30,000 and gas fixtures and electric appliances are to be manufactured.

The Carborundum Company of Niagara Falls, N. Y., are placing upon the market, a carborundum valve grinding compound for grinding valve seats and stems. The compound is composed of carborundum of the proper fineness mixed with grease.

The McCaskey Register Co., of Alliance, Ohio, manufacturers of cash registers, have purchased the plant, stock and patents of the American Case & Register Co., and will continue the manufacture of their line of goods. The American Case & Register Co., will enter into liquidation and go out of business.

A brass foundry is being started by the F. I. A. T. automobile company at Poughkeepsie, N. Y., and in which brass castings will be made for their cars. This concern, which have been making automobiles in Italy for some time, recently started a large plant in Poughkeepsie in which cars for the American market will be produced.

The Homer D. Bronson Co., of Beacon Falls, Conn., manufacturers of cabinet hardware, have been reorganized and a controlling interest in the company has been purchased by J. H. Woodward, for a number of years secretary of the Waterbury Brass Goods Corp. and previously connected with the Benedict & Burnham Mfg. Co. The officers of the new company are J. H. Woodward, president and treasurer; C. B. Tuthill, secretary; J. B. Burrall of the American Ring Co., of Waterbury, Conn., is interested in the company.

The Corcoran Lamp Co., of Cincinnati, Ohio, manufacturers of automobile lamps, are to move their plant to Detroit, Mich.

A site has been purchased and a new plant is to be erected by the Peninsular Safe & Lock Co., of Portland, Oregon.

An addition to the plant of the Peters Pump Co., at Kewanee, Ill., is being erected. The building will be two stories high and 40 x 60 feet.

The Springfield Motor Car Co., has been incorporated in Springfield, Ill., with a capital stock of $100,000 to manufacture automobiles. A factory, 110 x 220 feet will be erected.

The Thomasville Iron Works of Thomasville, Ga., has now moved into their new brick building and will use their old machine shop for a brass and iron foundry.

The Hanson & Van Winkle Co., of Newark, N. J., desire to call the attention of the trade to the fact that the Consolidated Plating Co., of Newark, N. J., and Racine, Wis., has no connection with their company.

The Millet Brass Co., of Springfield, Mass., manufacturers of brass and aluminum castings, are to build a new plant on St. James Ave., in that city. The foundry will be one story high in two 33 x 150 feet sections.

The Buffalo Foundry Supply Co., of Buffalo, N. Y., manufacturers of foundry supplies and which has been conducted in the past as a firm, have now incorporated the company with a capital stock of $20,000. The business will remain the same.

The electroplating department of Lawrence Bros., of Sterling, Ill., manufacturers of hardware specialties, was destroyed by fire on Nov. 5th, and it is expected that the rebuilding will follow with sufficient rapidity to enable them to resume operations in it by another month The main factory was not injured.

A plot of ground has been purchased by the Standard Brass Foundry Co., 6522 Central Ave., Cleveland, Ohio, and a new foundry will be built upon it. The plot is 50 x 200 feet and adjoins their present property. The increase has been made necessary by the demand for aluminum castings and their new foundry will increase their alum'num production three fold.

The profits in the aluminum industry may be fully appreciated by the recent announcement that the Aluminum Company of America have declared a stock dividend of 500 per cent. The capital stock has also been increased from $3,200,000 to $25,000,000. A dividend on the common stock is now being paid equivalent to 24 per cent. The company is also preparing for a very extensive enlargement of their plants so as to greatly increase their output The present capacity of the company is said to be about 20,000,000 lbs. of aluminum per year The use of aluminum in automobiles has been principally responsible for the enormous increase in consumption

A factory is to be erected by the McIntyre Watch Co., at Kankakee, Ill., for the manufacture of watches.

The Manistee Watch Co., of Manistee, Mich., are soon to commence the manufacture of watch dials.

The Green Bay Plating Co., has been organized at Green Bay, Wis., and will carry on jobbing electroplating at 227 Pine St., in that place.

The Non-Rust Metal Mfg. Co., has been incorporated at Beaver Falls, Pa., with a capital stock of $200,000 and will make metal specialties.

A new brass foundry is being erected by the Waterloo Brass Foundry of Waterloo, Iowa, and which will be used for the production of brass and aluminum castings. Oil furnaces will be used for melting.

Beline & Glaser of New York City, manufacturers of gold and sterling silver mesh bags, have moved their factory from 49 Second St., to 1352 Bryant Ave., (in the Bronx), New York City.

A new nickel plating plant will be installed by the Security Stove & Mfg. Co., of Kansas City, Mo. A new two-story brick factory is being erected at a cost of $12,000 and which is 125 feet square. All machinery will be electrically driven.

The Greyhound Motor Works, 1443 Niagara St., Buffalo, N. Y., manufacturers of motorcycles have acquired the plant formerly occupied by the Auto-Bi Company, manufacturers of the same line of goods. The Greyhound motor-cycle will be manufactured.

The Ingram Richardson Mfg. Co., of Beaver Falls, Pa., manufacturers of automobile tags, have received an order from the State of Pennsylvania for 40,000 enameled letter tags and also similar orders from the states of Connecticut, Michigan and New Jersey.

The Fielding Brass Co., of Charlotte, N. C., which was recently organized, have elected the following officers President, Walter Fielding; vice president, A. A. Fielding; secretary and treasurer, Lawrence Hagar. The plant will be located on the railroad between Trade and Fifth Sts. A general line of brass castings will be made as well as plumbers' brass goods

The International Chemical Co., of Camden, N. J., announce to the trade that they are the only concern in the United States, which make a specialty of the materials used in cleaning metal work previous to electroplating, tinning, galvanizing, japanning, lacquering, etc., and for rough cleaning between machine operations. They say that it has been found that many concerns do not use the cleaner best adapted for preparing their work. Their expert is prepared to give advice on the subject and suggests methods for cleaning that will be best adapted for the work.

The Absolute Time Co., has been incorporated in Atlanta, Ga., with a capital stock of $1,000,000 to manufacture clocks

The Morrisburg Tack Co., Ltd., has been incorporated in Morrisburg, Ont., Canada, with a capital stock of $40,000.

The Electric Supply & Fixture Co., has been incorporated at Fort Wayne, Ind., with a capital stock of $25,000 to manufacture electrical supplies and fixtures.

The Raymond Mfg. Co. Ltd., of Guelph, Ont., Canada, manufacturers of sewing machines, have increased their factory and are now manufacturing electrical supplies.

The Baldwin Chain & Cycle Mfg. Co., of Worcester, Mass., manufacturers of chains and steering gears, are erecting a two story addition to their works.

Louis L. Leach, expert modeller and designer, has opened an office at 400 Westminster St., Providence, R. I., and will make a specialty of medallion work and figures.

A new plant is to be built by the Indianapolis Brass Co., of Indianapolis, Ind., for the manufacture of electric railway goods. The factory is to be 40x100 feet.

Barkey Bros., of Stouffville, Ont., manufacturers of valves, have moved into their new factory. It consists of a two story building, 50 x 8 feet and which has been well equipped with valve manufacturing machinery.

The McCambridge-Cooper Co., of Philadelphia, Pa., recently formed by the consolidation of the Wm. S. Cooper Brass Works and the McCambridge Co., both manufacturers of plumbers' brass goods, are to move to Reading, Pa., where a factory has been obtained in the P. & R. R. R. foundry building.

It has recently been stated that the Dodge Mfg. Co., of Mishawaka, Ind., is manufacturing a bearing metal which has been turned to use in a direction which had not been contemplated by the company. Counterfeiters have been struck by its similarity in appearance to silver, and spurious coins made of it have been found in Western New York.

The Empire Metal Co., 30 Church St., New York City announce to the trade that they have changed their name to the Vernon Metal Co. This was brought about by the fact that, after organization, it was discovered that this name was already in use by the Empire Metal Co., of Syracuse and they recognized the right to it by priority. The change, therefore, was made in justice to them.

The Frankfort Brass Mfg. Co., has been incorporated in Frankfort, Ind., with a capital stock of $25,000 to take over the plant and business of the Frankfort Brass Works which has been in the hands of a receiver for some time. The Great Western Smelting & Refining Co., of Chicago, Ill., is interested in the plant. The directors are: J. A. Johnson, G. A. Burgess, G. L. Wire and F. L. Tuttle. The company are to make brass castings.

The Cattaraugus Cutlery Co., manufacturers of pocket cutlery, are to build a new factory at Little Valley, N. Y.

The Dominion Wire Mfg. Co., of Montreal, Canada, manufacturers of steel, copper and brass wire, are to establish a branch factory in Vancouver, B. C.

The Buckeye Products Co., 2306 Eastern Ave., Cincinnati, Ohio, are sending out to the trade a circular on their Buckeye parting describes its good qualities and which will be sent to those interested.

Charles Potter, 85 Yonge St., Toronto, Canada, is equipping a plant with oxy-acetylene apparatus for carrying on oxy-acetylene welding for the Canadian trade. The Linde process is used.

M. M. Andler & Co., Boston, Mass., are first hands on both old and new metals of all descriptions and supply ingot brass to the trade. They also purchase skimmings, drosses, and brass foundry ashes in any quantity.

The C. H. Besly Co., of Beloit, Wis., manufacturers of disc grinders, have completed plans for the erection of a new addition to their plant for the manufacture of this appliance.

The new brass foundry of the Burlington Brass Co., of Burlington, Wis., manufacturers of plumbers' brass goods, is being equipped with oil melting furnaces with a capacity of 4000 lbs. per day.

E. H. Lunken of the Lunkenheimer Co., Cincinnati, Ohio, manufacturers of steam goods, has purchased a large tract of land in Chicago, Ill., and will erect a plant for the manufacture of metal window frames. It is expected that 500 hands will be employed.

The Williams Sealing Corporation has been organized in Waterbury, Conn., for the manufacture of bottle and jar caps. Manufacturing will shortly commence. John H. Goss is the president, Geo. A. Williams treasurer and general manager, and N. R. Bronson, secretary.

The Leading Brass & Metal Co., of St. Louis, Mo., brass founders and manufacturers of babbitt-metals and aluminum castings, announce that they have now moved to their new plant at 2713-2715 Hickory St., where superior facilities are had for the production of their goods. They also announce to the trade that they are making a specialty of automobile castings in manganese-bronze and white brass for bearings.

The United States Alloys Co., of Baltimore, Md., make a specialty of fluxes and alloys for brass foundry use. They supply manganese, manganese-copper, silicon-copper, manganese-bronze, the ferro-alloys, chloride of zinc, and many other alloys. They also make special alloys to order and are prepared to quote the lowest market rates. Brass founders should send for their circular which enumerates the large number of their products.

The American Motor Co., of Brockton, Mass., manufacturers of motorcycles, are erecting a two story addition to their shops.

Henry Lederer & Bro. Inc., of Providence, R. I., manufacturers of jewelry, have moved to 150 Chestnut St., in that city.

The Sheffield Plate Co., of Taunton, Mass., manufacturers of silver ware, and now employing 30 hands, are seeking another location and have Pawtucket, R. I., under consideration.

The firm of Rush and Kinney, owners of the Federal Brass Foundry at South Bend, Ind., has been dissolved, and the business will be continued by George Rush.

The Syracuse Wire Works of Syracuse, N. Y., manufacturers of artistic wire work, are now placing upon the market a line of hammered copper work such as portable lamps, ash-trays, etc.

The new brass foundry of the Lumen Bearing Co., of Buffalo, N. Y., will contain a five ton travelling crane, a pattern-shop and also a new chemical laboratory. Crucible furnaces using oil for fuel will be employed for melting.

The White Sewing Machine Co., of Cleveland, Ohio, has awarded a contract for the erection of a new plant in that city. It will be situated on St. Clair Ave. and 76th St., adjoining that of the White Company, manufacturers of automobiles.

The Vernon Metal Co., 30 Church St., New York City, have facilities for supplying aluminum in ingot form at the lowest market rates and solicit inquiries on the subject. They are also prepared to supply pig tin, lead, spelter, antimony and ingot copper.

A plant for the manufacture of automobiles is to be established by the Studebaker E. M. F. Co., in Walkerville, Canada. It is stated that $400,000 will be spent on the plant and this factory, which will be a branch of the Detroit plant, will take care of the Canadian trade.

A tract of land on Clybourne Ave., has been purchased by the Globe Metal Co., of Chicago, Ill., manufacturers of ingot brass and scrap metal refiners. The tract is 120 x 140 feet and a plant similar to their present one at 1334 West Lake St., will be built. The need of additional room has made this change imperative.

The new factory of the Tallman Brass & Metal Co., on Wilson St., east of Sanford Ave., Hamilton, Canada, has now been opened and the capacity of the plant has been doubled. The rapid increase in the business of this company has made the new plant a necessity. The manufacture of brass castings, babbitt-metals, solder, linotype, stereotype and monotype metals is carried on. A fire proof pattern vault has been installed as well as the latest types of foundry equipment.

C. G. Conn & Co., of Elkhart, Ind., manufacturers of brass band instruments, are to erect a new factory in the near future.

The C. S. Mfg. Co., has been incorporated at Killbuck, N. Y., with a capital stock of $20,000 to manufacture silverplated ware.

The Commercial Metal Co., has started in business at 280 and 282 Commercial St., Boston, Mass., and will deal in scrap metals.

The Rockford Metal Specialty Co., of Rockford, Ill., manufacturers of metal specialties, are to move into larger quarters in the Talcott Building in that city.

The Victoria Safe & Lock Co. has been incorporated at Victoria, Texas to manufacture safes and locks. R. L. Daniel is the president and O. E. J. Lodee manager.

Marshall I. Smith, manufacturer of dies, tools and similar metal goods, is obtaining estimates for an electroplating plant at his works in Bristol, Conn.

The Manufacturers Refining Co., 45 Claverick St., Providence, R. I., gold and silver refiners and sweep smelters, are to erect a new plant at Ship and Eddy St.

The Bellows Falls Machine Co., of Bellows Falls, Vt., who have been manufacturing paper making machinery for many years, are closing their brass foundry and will not operate it any longer.

The Elkhart Brass Mfg. Co., of Elkhart, Ind., manufacturers of brass goods and brass founders, are to erect a new factory 160x226 feet and one story high. Operations will be commenced early in the year.

The Beaver Dam Malleable Iron Co., Beaver Dam, Wis., stove manufacturers, are to erect two new buildings, 150 x 320 feet and which will be built and equipped soon after the first of the year.

Personal.

A. E. Snow, manager of the New York office of the Plume & Atwood Mfg. Co., of Waterbury and Thomaston, Conn., was recently elected president of the Pottery, Glass and Brass Salesmens' Association of America.

Charles Kirchoff, who for nearly thirty years has been editor in chief of the *Iron Age* and was largely responsible in bringing it to its present high standard of trade journalism, has retired from active business.

Cornelius Conners, formerly with C. H. Allen & Co., of Attleboro, Mass., has accepted the position of foreman of the coloring and plating departments of Kelly Bros., of the same city.

Herbert J. Hawkins, formerly with the Dow Chemical Mfg. Co., of Mansfield, Ohio, has resigned his position with the company and has accepted a similar one with the Hanson & Van Winkle Co., of Newark, N. J., for whom he will travel from the Chicago office.

Current Metal and Supply Prices.

These Prices are net and are for moderate quantities. Smaller quantities command higher prices. Prices subject to fluctuation.

Acetone, pure, 98-99%	lb.	.22
Acid, Acetic, pure, 30%	lb.	.07
Acid, Arsenious (White Arsenic)	lb.	.20
Acid, Benzoic	lb.	.55
Acid, Boracic (Boric), pure	lb.	.12
Acid, Hydrochloric, see Acid, Muriatic.		
Acid, Hydrofluoric, 30%	lb.	.04
Acid, Hydrofluoric, 50%	lb.	.10
Acid, Muriatic, 20°	lb.	.02
Acid, Muriatic, c. p., 20°	lb.	.07
Acid, Nitric, 38	lb.	.05⅝
Acid, Nitric, 40	lb.	.05⅞
Acid, Nitric, 42	lb.	.06¼
Acid, Nitric, c. p.	lb.	.08
Acid, Sulphuric, 66	lb.	.01¾
Acid, Sulphuric, c. p.	lb.	.06
Alcohol, Wood	gal.	.50
Alcohol, Denatured	gal.	.55
Alum	lb.	.04
Aluminum, Sulphate	lb.	.06
Aluminum, Metallic, in Ingots	lb.	.24
Aqua-Fortis, see Acid, Nitric.		
Ammonia Water (Aqua-Ammonia), 20	lb.	.04¾
Ammonia Water (Aqua-Ammonia), 26	lb.	.06¼
Ammonia Water, c p.	lb.	.08
Ammonium Carbonate, lump	lb.	.15
Ammonium Chloride (Sal-Ammoniac)	lb.	.12
Ammonium Hydrosulphuret	lb.	.30
Ammonium Sulphate	lb.	.07
Ammonium Suphocyanate	lb.	.50
Amyl Acetate	gal.	1.85
Antimony	lb.	.08⅜
Arsenic, Metallic	lb.	.15
Arsenic, White (Acid Arsenious)	lb.	.20
Argols, White (Cream of Tartar)	lb.	.31
Asphaltum, Commercial	lb.	.05
Asphaltum, Egyptian (Bitumen)	lb.	.30
Benzine	gal.	.15
Benzol, Pure	gal.	.75
Bismuth, Metallic	lb.	1.75
Bitumen, see Asphaltum.		
Blue-Vitriol, see Copper Sulphate.		
Borax, Crystals or Powdered	lb.	.10
Borax Glass	lb.	.35
Cadmium, Metallic	lb.	.70
Carbon Bisulphide	lb.	.10
Calcium Carbonate (Precipitated Chalk)	lb.	.10
Chrome-Green	lb.	.50
Copper, Lake, (carload)	lb.	.13½
Copper, Lake, (cask)	lb.	.13¾
Copper, Electrolytic (carload)	lb.	.13¼
Copper, Electrolytic (cask)	lb.	.13½
Copper, Casting (carload)	lb.	.13¼
Copper, Casting (cask)	lb.	.13½
Copper Acetate (Verdigris)	lb.	.35
Copper Carbonate, dry	lb.	.25
Copper Sulphate (Blue-Stone)	lb.	.09
Copperas, see Iron Sulphate.		
Corrosive Sublimate, see Mercury Bichloride.		
Cream-Tartar, see Potassium Bitartarate.		
Cryolite	lb.	.12
Cyanide, see Potassium Cyanide		
Dextrin	lb.	.15
Emery Flour	lb.	.04
Emery, F F & F F F	lb.	.03
Flint powdered	lb.	.01
Fluor Spar	lb.	.01¼
Fusel-Oil	gal.	1.75
Gold Chloride	dwt.	.60
Gum Copal	lb.	.30
Gum Guiacum	lb.	.26
Gum Mastic	lb.	.70
Gum Sandarac	lb.	.35
Gum Shellac, brown	lb.	.50
Gum Shellac, white	lb.	.60
Iron Perchloride	lb.	.25
Iron Sulphate (Copperas)	lb.	.05
Lead Acetate (Sugar of Lead)	lb.	.15
Lead, Pig	lb.	.04½
Lead, Red	lb.	.12
Lead, Yellow Oxide (Litharge)	lb.	.12
Liver of Sulphur, see Potassium Sulphide.		
Manganese, Ferro, 80%	lb.	.10
Manganese, Metallic, pure	lb.	.75
Magnesium, Metallic	lb.	1.50
Mercury Bichloride (Corrosive Sublimate)	lb.	.93
Mercury, Metallic (Quicksilver)	lb.	.89
Mercury Nitrate	lb.	1.50
Mercury Oxide, yellow	lb.	1.80
Nickel and Ammonium Sulphate (Double Salts)	lb.	.16
Nickel Carbonate, dry	lb.	.60
Nickel Chloride	lb.	.50
Nickel Metallic	lb.	.47
Nickel Sulphate (Single Salts)	lb.	.25
Nitre (Saltpetre), see Potassium Nitrate.		
Oil of Vitriol, see Acid, Sulphuric.		
Paraffine	lb.	.15
Phosphorus, yellow	lb.	.40
Phosphorus, red	lb.	1.10
Pitch	lb.	.05
Plaster of Paris, Dental	bbl.	4.00
Platinum Chloride	oz.	14.50
Platinum Metallic	oz.	33.25
Potash-by-Alcohol, in sticks	lb.	.50
Potash, Caustic (Potassium Hy-drate)	lb.	.08
Potassium Bichromate	lb.	.14
Potassium Bitartarate (Cream of Tartar)	lb.	.31
Potassium Carbonate (Pearlash)	lb.	.10
Potassium Chlorate	lb.	.15
Potassium Cyanide	lb.	.25
Potassium Iodide	lb.	2.25
Potassium Nitrate (Nitre or Saltpetre)	lb.	.10
Potassium Permanganate	lb.	.17
Potassium, Red Prussiate	lb.	.60
Potassium, Yellow Prussiate	lb.	.24
Potassium Sulphide (Liver of Sulphur)	lb.	.15
Potassium Sulphuret, see Potassium Sulphide.		
Potassium Sulphocyanate	lb.	.70
Pumice, Ground	lb.	.05
Quartz, Powdered	lb.	.01
Rosin, Yellow	lb.	.04
Sal-Ammoniac, see Ammonium Chloride.		
Sal-Soda, see Sodium Carbonate.		
Silver Chloride, dry	oz.	.75
Silver Cyanide	oz.	1.00
Silver, Fine	oz.	.51⅛
Silver Nitrate, crystals	oz.	.50
Soda-Ash	lb.	.05
Sodium Biborate, see Borax.		
Sodium Bisulphite	lb.	.15
Sodium Carbonate (Sal-Soda), crystals	lb.	.02
Sodium Hydrate (Caustic Soda)	lb.	.05
Sodium Hydrate (Caustic Soda) by Alcohol (in sticks)	lb.	.45
Sodium Hyposulphite ("Hypo")	lb.	.04
Sodium Metallic	lb.	.90
Sodium Nitrate	lb.	.05
Sodium Phosphate	lb.	.09
Sodium Silicate (Water-Glass)	lb.	.04
Soot, Calcined	lb.	.15
Spelter, see Zinc.		
Sugar of Lead, see Lead Acetate.		
Sulphur (Brimstone), in lump	lb.	.05
Tin Chloride	lb.	.43
Tin, Metallic	lb.	.31⅝
Turpentine, Venice	lb.	.35
Verdigris, see Copper Acetate.		
Water, Distilled	gal.	.15
Water-Glass, see Sodium Silicate.		
Wax, Beeswax, yellow	lb.	.45
Wax Carnauba	lb.	.70
Whiting (Ground Chalk)	lb.	.02
Zinc Carbonate, dry	lb.	.19
Zinc Chloride	lb.	.12
Zinc, Sulphate	lb.	.06
Zinc (spelter)	lb.	.06⅝

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THE
BRASS WORLD
AND
PLATERS' GUIDE

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